



WESTERN AUSTRALIAN YEAR BOOK 1988

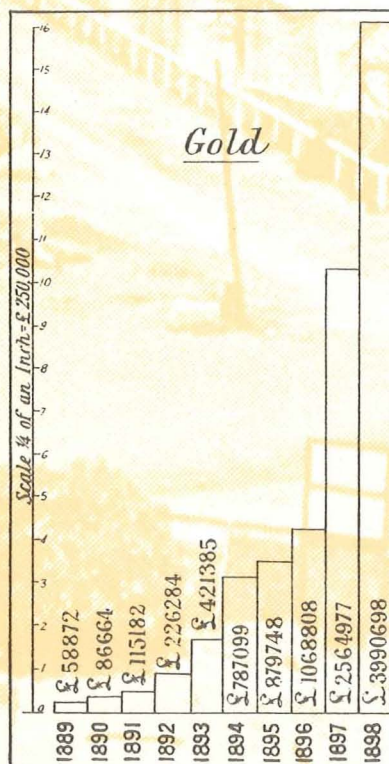
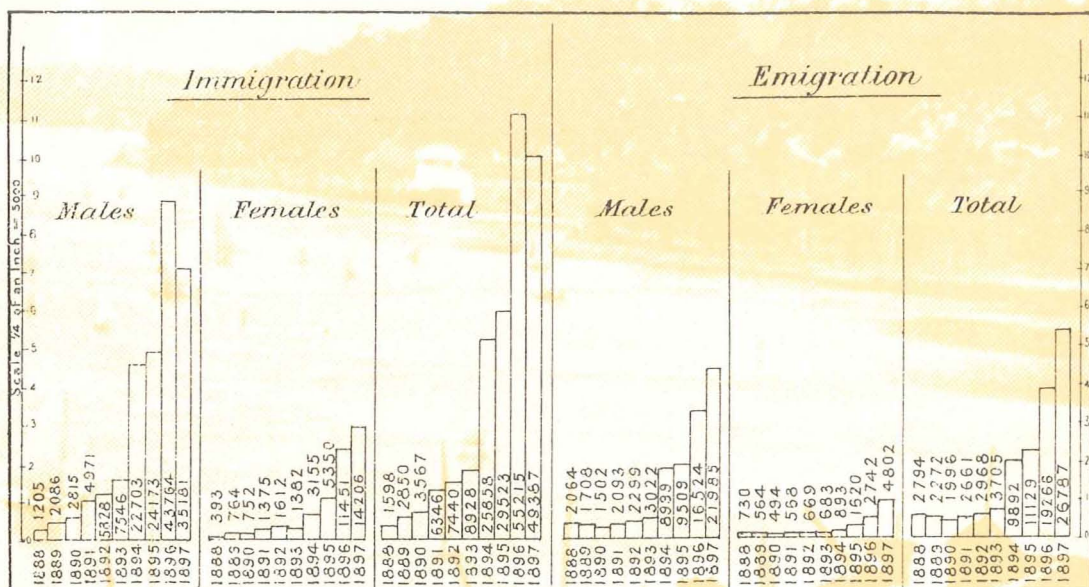


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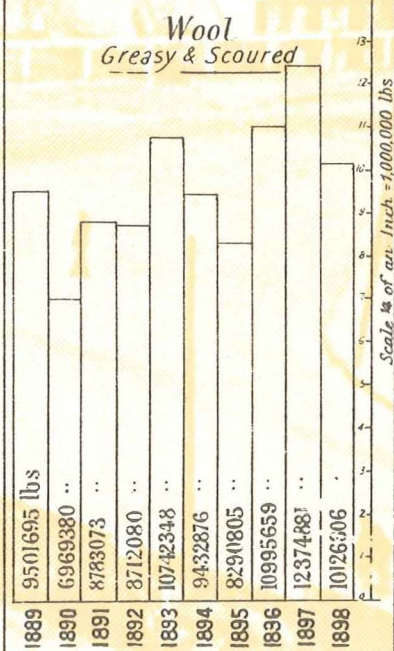
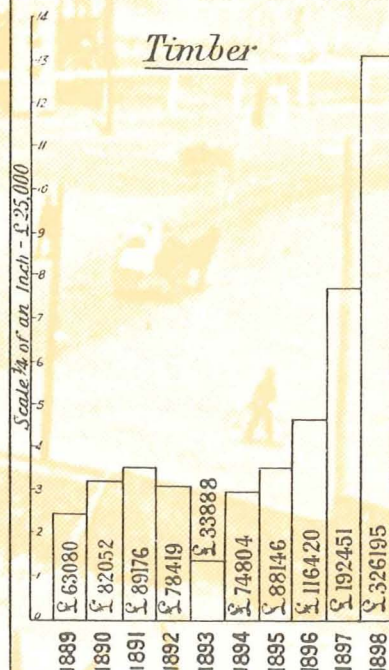
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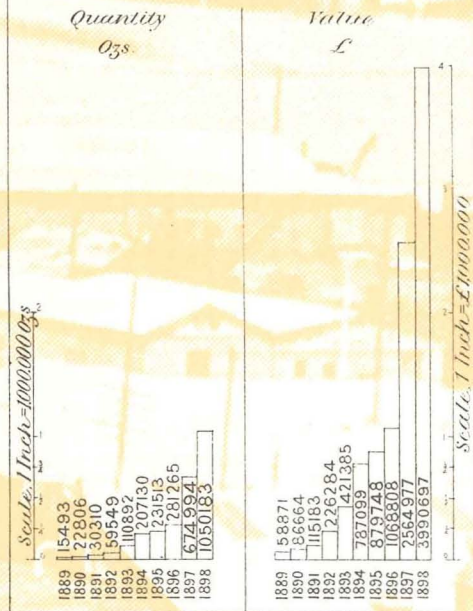


Principal Exports
(the Products of the Colony)

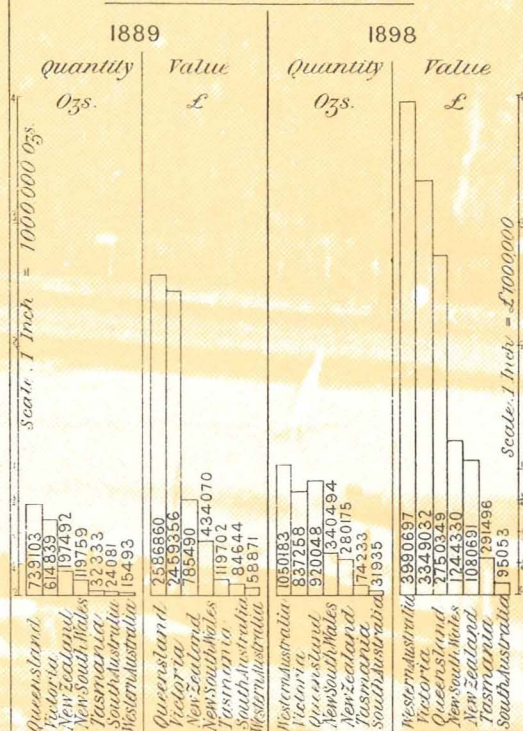


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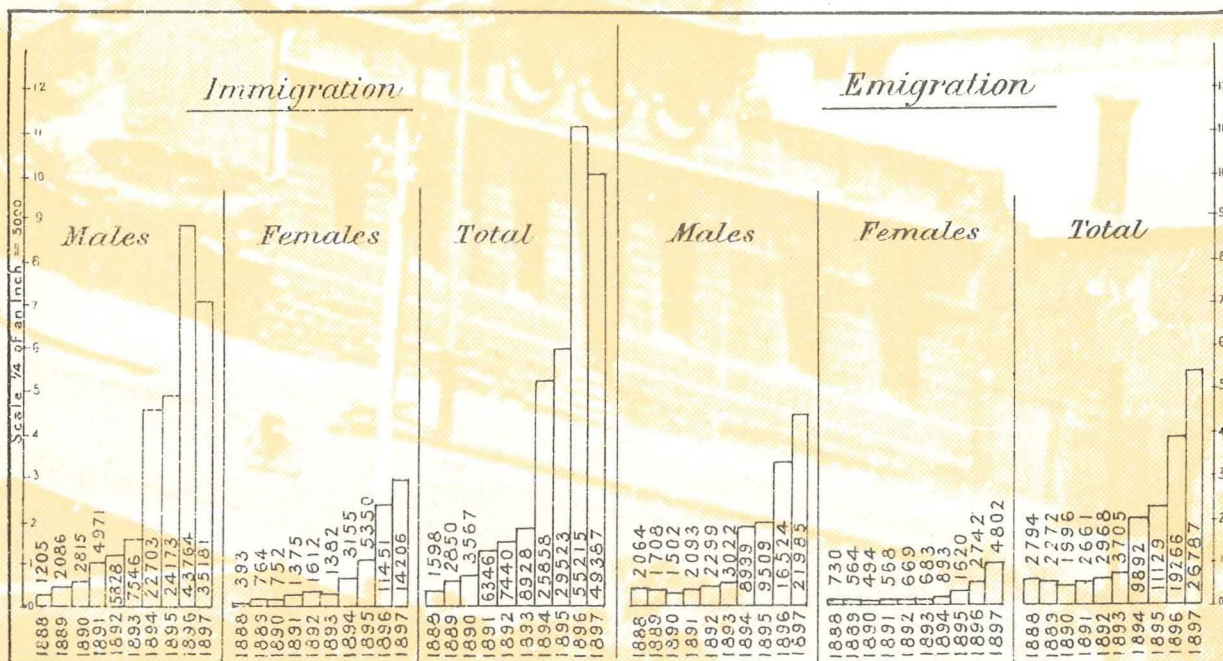
GOLD YIELD OF WESTERN AUSTRALIA (1889 to 1898)



GOLD YIELD OF AUSTRALASIA



The official valuations by ounce of gold for the Colonies are as follows
W.A. VIC. Q. N.S.W. N.Z. TAS. S.A.
1889 £3 16s. 4d., £3 10s.; £3 12s. 6d., £3 19s. 6d.; £3 14s. 0d.; £2 10s. 3d.
1898 £3 16s. 4d., £2 19s. 3d.; £3 13s. 1d.; £3 17s. 4d.; £3 18s. 6d.; £2 19s. 6d.



WESTERN AUSTRALIAN YEAR BOOK

1988

PERIODICALS SECTION
NORTHERN TERRITORY UNIVERSITY
CASUARINA CAMPUS

20 FEB 1989

Cover: Kimberley scrub country in the early morning

Photograph: Richard Woldendorp, Photo Index.

Frontispiece: Orchestral performance by The Royal Danish Orchestra at the Lecuwin Estate Winery, Margaret River. These open air performances have become a popular and distinctive feature of Western Australia's cultural activities.

Photograph: Photo Index, Roger Garwood.

Endpapers: In the background is a view of the Swan River from the foot of William Street, Perth about 1906. The charts are extracts from the *Western Australian Year Book 1898-99*.

Photograph: West Australian Newspapers Ltd.



WESTERN AUSTRALIAN YEAR BOOK

No. 25 — 1988

B. N. PINK

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GENERAL INFORMATION

Symbols

The following symbols mean:

n.a.	not available
n.e.c.	not elsewhere classified
n.e.i.	not elsewhere included
n.e.s.	not elsewhere specified
n.p.	not available for separate publication (but included in totals where applicable)
n.y.a.	not yet available
p	preliminary—figure or series subject to revision
r	figure or series revised since previous issue
..	not applicable
*	subject to sampling variability too high for most practical uses
—	nil or rounded to zero
——	break in continuity of series (where drawn between two consecutive figures or columns)

Other forms of usage

Rounding. Where figures have been rounded, discrepancies may occur between sums of the component items and totals.

Availability of ABS publications

Information regarding the availability of ABS publications can be obtained from the Information Services Section, Australian Bureau of Statistics, Hyatt Centre, 30 Terrace Road, Perth, W.A. 6000, or from other ABS Offices.

The *Catalogue of Publications* issued by Central Office of the ABS provides a comprehensive list of all statistical publications issued by the ABS. This is available free of charge from any ABS Office.

In some cases, the ABS can also make available information which is not published. This information may be made available in one or more of the following forms: microfiche, photocopy, data tape, computer printout or clerically extracted tabulation. Generally a charge is made for providing unpublished information. Inquiries may be made by contacting Information Services at this Office.

PREFACE

The *Western Australian Year Book* is a general reference work on Western Australia and includes authoritative information on almost every aspect of life in the State. Together with chapters on the social, demographic and economic structure of the State, the Year Book includes information on history, geography, climate, vegetation and fauna, and government. Each chapter contains the latest information available at the time of manuscript preparation.

This 1988 edition of the Year Book marks many changes in structure and content from previous editions. A two-column format has been adopted to improve the accessibility of subjects; the text has been condensed significantly and the first of a series of regional profiles of statistical divisions commences with Chapter 25 — South-West Statistical Division Profile. Also for the first time, a soft-cover edition has been printed.

Constraints of time and space mean that the Year Book can only be illustrative of the wide range of data available from the ABS in over 1,500 publications, or on microfiche, magnetic tape, floppy disk, CD-ROM, or electronically through VIATEL or AUSSTATS. The publications of the Western Australian Office are listed in the Appendix.

I express my appreciation to the many outside contributors, officers of the Bureau, and the staffs of Computer Graphics Corporation and the Department of Services, State Printing Division for their work on the Year Book project. It is also appropriate that I acknowledge the valuable contribution made to the Western Australian Year Book during her many years as Assistant Editor by Laura Hodan, B.A.(Hons); she retired from that position during 1987.

October 1988

B. N. PINK
Deputy Commonwealth Statistician
and Government Statistician

Chapter 1

WESTERN AUSTRALIA: A HISTORY

Contributed by C. T. Stannage, M.A., Ph.D.

(Associate Professor of History, University of Western Australia)

Australia has always been a maritime nation; and Western Australia has always been a maritime State. The first Australians were not men out of Europe but peoples from South-East Asia who 40,000 years ago, when seas were low, wound their way from island to island until they landed in the north-west and north of Australia. Europeans would call these people the Aborigines. Their wood and bark canoes and coracles bear testimony to their sea and river faring skills. They were a people of great technical ingenuity and enterprise. There were 300,000 of them in Australia when Europeans first made a permanent settlement, at Sydney in 1788. By 1900, through slaughter, disease and epidemic the Aborigines had been reduced in numbers to less than 100,000. In recent years there has been a resurgence of Aboriginality and many of the skills of Aborigines have been revived. European Australians now have an increased awareness and understanding of Aboriginal life and culture, of what has been described as 'the Triumph of the Nomads'.

But even as the Aborigines used sea and river craft to settle the continent of Australia, Europeans, perhaps 2,000 years ago, believed that there existed a great South Land, equal to the North Land known to the Greeks and Romans. This Unknown South Land they described as Terra Australis Incognita. They believed that it was a paradise and a place of great antipodean wealth. Some men, particularly the Spanish in the 15th and 16th centuries, even thought that it was Ophir, the ancient civilisation which had provided gold for King Solomon. And it was thought that Marco Polo had described it, using the words 'One then reaches a continental province called Locac which is very large and rich'. The myth that Western Australia, when found, would be a southern paradise, is seen in Gabriel de Foigny's 1676 description 'the southland is a truly blissful place. Its climate is temperate; it never experiences rain storms or gales, and it is only rarely that there are light snow falls. In a word it is a country which encompasses all the delights which are absent in the other parts of the world'. Many present day Western Australians, and generations of visitors, would agree with de Foigny. By 1700 southern Western Australia was described by an employee of the Dutch East India Company at Batavia as being in 'Climate 5',

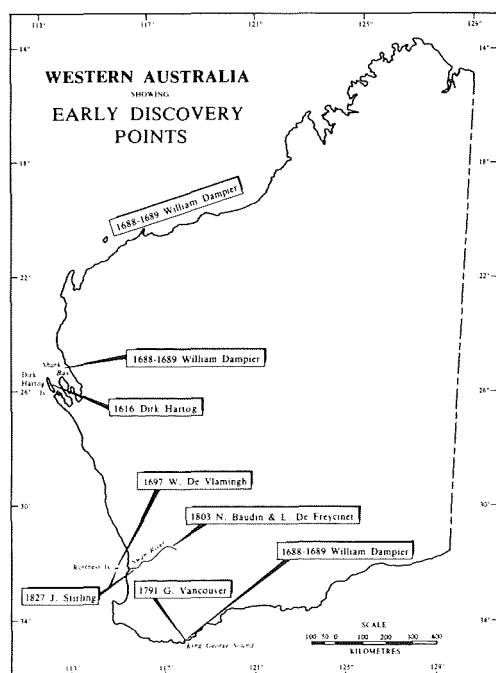
the southern equal of the most beautiful and bountiful climate of the northern hemisphere which included Persia and the Mediterranean.

Thus all the seafaring nations of the world were interested in Australia. The Chinese sent a sailor south in the 15th century, and in 1601 a Dutch ship the *Duyfken* came on Cape York Peninsula. Then in 1616 Dirk Hartog landed at Shark Bay on the north-west of Western Australia. Under the command of Francis Pelsart the *Batavia* in 1629 was wrecked on one of the Abrolhos islands. The ship was lost but most of the crew and passengers escaped to shore. While Pelsart sailed on in an open boat to Batavia, some of his stranded crew mutinied and murdered many passengers. They themselves were executed when Pelsart returned. Other ships, including the fabulous *Gilt Dragon* (rediscovered in 1963), were also wrecked. Thus the hopes of many visiting seamen were dashed in Western Australia!! In 1658 Volckersen described the coastline near Rottnest Island and where Fremantle now stands. For him it looked less a paradise than a barren, wild and waterless place. In 1696 and 1697 William Vlamingh even explored the Swan River, but he too was unimpressed. An English adventurer, William Dampier, was even more critical.

He liked the wildflowers, which have remained of enduring fascination to all who come to Western Australia, but he reported in his *Voyage to New Holland in the Year 1699* that there was nothing to attract a European settlement and that the Aborigines were hostile.

While French maritime explorers like d'Entrecasteaux (1792), Nicholas Baudin (1801), and d'Urville (1826) reached southern Western Australia, it was left to another English seaman, James Stirling, imbued with Romanticism and the literature of Swan River being an earthly paradise, to describe southern Western Australia in such glowing terms (as rich as the Plains of Lombardy or Virginia in America) that he persuaded the British Government to found a settlement there in 1828. Thus on 1 June 1829 the greatest naval and trading power in Europe 'invaded' Western Australia and established the country as a British Settlement.

DIAGRAM 1.1



The British settlement of Swan River Colony, later to be called Western Australia, was founded by a hard-driving entrepreneur in Captain James Stirling. He and his fellow investing colonists were given Crown land proportionate to the amount of capital and labour they brought with them. Many of them came from the lesser gentry class of Britain. And their servants and indentured labourers came from rural poorhouses in the old country. Some of the gentry failed to 'make a go of it' in Western Australia because they lacked the mental toughness and farming skills needed to prosper in a land where the seasons were upside down and the trappings of civilisation few. Some of the servants and labourers did better than their masters, thus providing the origins of the myth that in Western Australia anyone who was shrewd and who worked hard and kept sober could acquire wealth and a colonial reputation. This belief, which Americans call the 'success ethic', undergirded the careers of Alan Bond in the 1970s, no less than that of Walter Padbury, a shepherd's boy, one hundred and twenty years before him. The law and politics in Western Australia were arranged so that money could beget money. The gentry made it hard for the rest because they believed that there should always be masters and servants, but some poor men broke through and won for themselves power and high status. Overall the colony battled to survive. With a minuscule population of 1,875 in 1831, it had only 5,900 in 1850. It was dependent on the sea for news, trade and protection. The colonists bought foodstuffs and goods from Tasmanian ships, but until the rich farmlands of York, ninety-five kilometres inland from Perth, were opened up, they had little to sell in return. In the 1840s they not only sold some wool to England, but they also engaged in the Far Eastern trade, selling large quantities of sandalwood to the Chinese who liked its scent. They built little vessels for trading purposes, and large merchants like George Shenton owned ships. Even the government owned a ship called *The Champion* which traded in eastern waters and even brought in coolie labourers as migrants. Perth, sixteen kilometres up the Swan, on a broad expanse of water, had been established as the Colony's capital, while Fremantle at the

mouth of the Swan River was the major port.

While some had prospered in the first two decades, others had lost respectability and comfort. Some affluent men, seeking to turn Western Australia into the *el dorado* of legend, sought to bring in a large and cheap labour force which would ensure their futures. George Shenton, the merchant, William Burges, the farmer, the Samson family of Fremantle, and James Stokes, the biggest brewer in Perth, won government support, and in June 1850 the first boatload of British convicts arrived in Western Australia. In the next eighteen years nearly 10,000 more convicts would follow, and the Western Australian population at the end of the convict era (1870) had reached 25,000 in all, still not large, but large enough to ensure the prosperity and future of the colony.

The convict years were bitter ones for Western Australia. One person had written:

'The Convicts are coming—what capital sport,
The road to the gallows made easy and short,
And long will the Swanites remember the day,
When the convicts were sent to their shores by Earl Grey.'

The poet was right. Western Australians have tried to forget about convictism, for it was thought to be a dreadful blot on the Colony's history. But the convict legacy is everywhere. Today a walk down the city's premier street, Saint George's Terrace, shows the remains of the barracks of the convict guard; a school (the Cloisters) built by convict workmen; and Government House (1864). And from the Terrace one can see the old convict-built Town Hall, the tower of which is characterised by bizarre convict-derived markings. Across the city is the beautiful Western Australian Museum, part of which was a gaol in convict times, indeed the hanging place for several of the more desperate convict bushrangers. The free people of Perth and Fremantle learnt to live with the brutalising presence of the male convicts (no female convicts were sent to Western Australia), though many carried guns by day and few ventured far afield at

night: 'the unfortunate constable was found lying speechless and senseless . . . a long jagged wound on the crown of his head'; and women feared for themselves and their children.

One of the most dramatic events of these years was the escape of some Irish Fenian convicts in an American whaling boat, the *Catalpa*, in April 1876. Americans had killed whales off the Western Australian coast for fifty years and were well known visitors to our ports. They were incredible and audacious seamen. The *Catalpa* expedition was organised from Boston. The boat withstood a charge from the British naval vessel at Fremantle, the *Georgette*, and made off with the escapees. Earlier, another Irishman, John Boyle O'Reilly, had escaped to America where he became editor of the *Boston Pilot* and a poet and novelist. Within a month of the *Catalpa* escape a song was written about it, which was also sung in America. Part of it goes:

'A noble whaleship and commander,
Called the Catalpa they say,
Sailed out to Western Australia,
And took six poor fenians away.

Come all you screw warders and jailers,
Remember Perth Regatta Day,
Take care of the rest of your fenians,
Or the Yankees will steal them away'.

By one of history's ironies Perth was proclaimed a City by Queen Victoria at the height of convictism (1856). Western Australia was now a well-established part, even if not yet a jewel, in the British Empire. From the 1860s a pastoral industry of significant proportions had developed in the north-west, along the De Grey, Ashburton and Fortescue Rivers, which a hundred years later would become famous as the Pilbara iron ore country. Local men and capital had been joined by eastern colonial and British investors. In the south-west the old families held sway in agricultural and political matters, but there was also now a flourishing timber industry; the jarrah wood was becoming so famous for its tough qualities that it was used in India and in London for road and bridge construction. Western Australia was still under Imperial tutelage, with a

small Legislative Council. Government House was the centre-piece of social life:

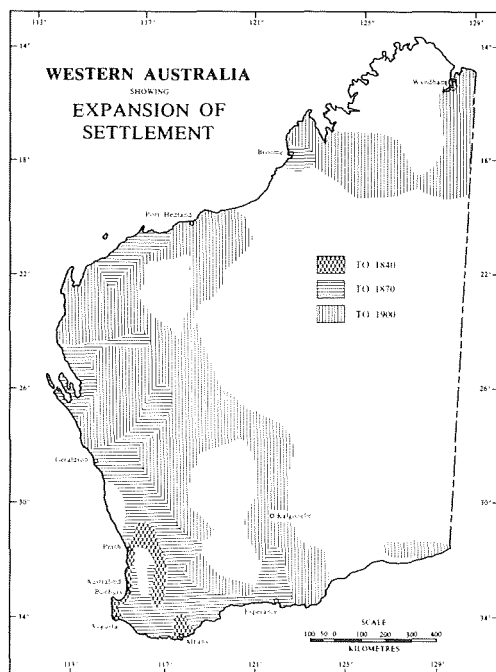
'a bow from his Excellency, or a word from the Governor's Lady, stamps the happy recipient as one of the elite'.

Yachting on the Swan River had become a popular sport for the more prosperous people of Perth.

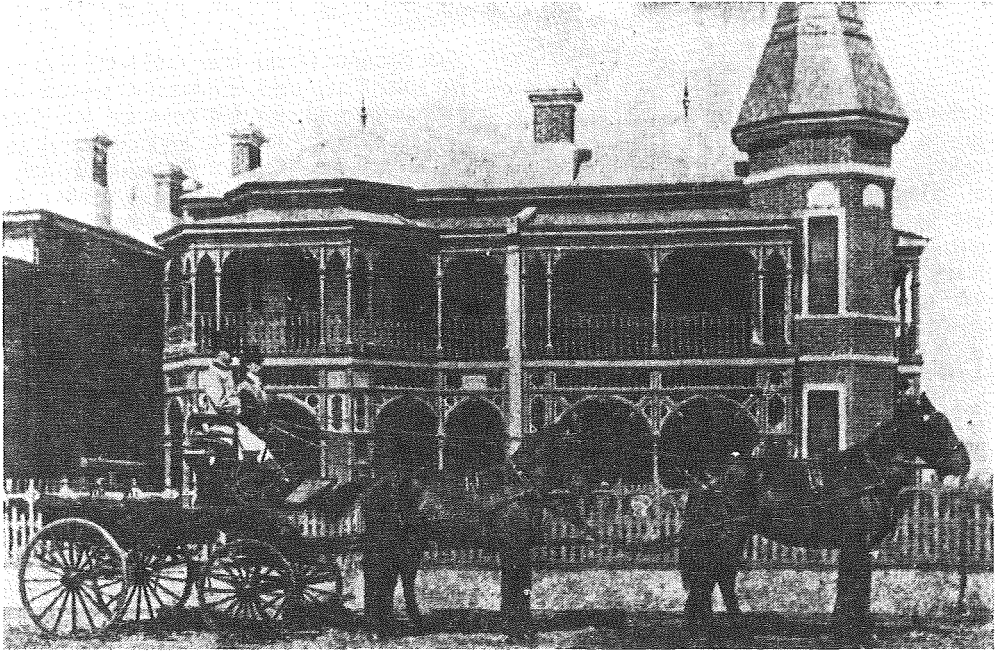
In the 1850s, when Victoria and New South Wales had goldrushes, some Western Australians had written that 'The discovery of gold would prove the greatest evil that could possibly befall us for it would excite passions and habits of excess', as had happened in California. But another wrote in the late 1870s 'Gold, if really found in paying quantities, would be a panacea for all evils in the colony'. And gold was found, in huge quantities from the mid 1880s through to the present day. So the prophecies of the ancients about Ophir and the fabulous wealth of a country in the '5th Climate' did come to pass, if too late for many of the struggling pioneers. Between 1890, when Western Australia became self-governing, as the Americans had done 115 years before, and 1912 the population of Western Australia increased from about 48,000 to 305,000. Perth was no longer the smallest Australian capital city. The great P & O ships, which since the 1850s had called at the southern port of Albany, now called at Fremantle which became the first port in Australia for all international maritime activity. It was to remain so for most of the twentieth century.

Gold had brought thousands of people from all over the world. Americans were present aplenty, including a young mining engineer called Herbert Hoover, later to be President of the United States of America. American sportsmen also came West, including boxing troupes. In this period of unprecedented growth, the faces of the cities of Fremantle and Perth were transformed. Old cottages, warehouses, hotels and stores were pulled down and replaced with larger, more elaborate structures, which still give Fremantle its character today, although in Perth the 1890s and 1900s buildings are dwarfed by the skyscrapers of the 1960s and 1970s, the years of the second great mineral boom.

DIAGRAM 1.2



These years before the Great War of 1914-18 were frenzied ones for Western Australia. One observer wrote 'the air in Perth is full of the yellow fever. Its germs, in the shape of talk of reefs, leases, claims, yields, trial crushings, syndicates, stocks and Company flotations, are as thick as a London fog . . . every businessman in the city is bound, body and soul, to the new industry'. Entrepreneurs abounded. The greatest was William G. Brookman. Bankrupt in South Australia in 1892 he was a prosperous goldmine owner in Western Australia by 1895. His Great Boulder Mine was fabulously rich. By the late 1890s Brookman owned huge slabs of Perth real estate, a vast house called 'Great Boulder', a country and seaside estates, even a motor car. He also had a splendid yacht for sailing on the beautiful Swan River and across to Rottnest. In 1900 he became Mayor of the City of Perth, having declared that he would 'make this city a fairer Athens and a freer Rome'. Alas, by 1904 he was bankrupt again. But in his time he had established over fifty mines,



W.G. BROOKMAN'S RESIDENCE, 'GREAT BOULDER', ADELAIDE TERRACE, PERTH.

Courtesy Battye Library, B 11917

with an investment value of 35 million pounds. Brookman was the prince of entrepreneurs, but there were plenty of knights and barons.

Among them were members of the old families, including John and Alexander Forrest, perhaps the most famous sons of Western Australia. As young men the Forrests were intrepid explorers of the Westralian outback and the Kimberley region, now known for its diamonds, but then to become the centre of a great cattle industry. Later, both men were tough entrepreneurs, with pastoral land in the north, urban real estate and considerable political power. John became Premier of Western Australia in 1890 and resigned only in 1901 when he was elected to the new Federal Parliament (Western Australia joined the other colonies in a Federation in 1901). Alexander was Mayor of Perth several

times. There are statues of both men in Perth and in Kings Park overlooking the city. The Forrests and other pioneer families did not simply survive the goldrushes; rather they directed and contained the anarchic energy of the period. Western Australia experienced great changes in the mid twentieth century, but the Forrests continued to embody 'the spirit of place'—that men of energy and vision and patriotism would be rewarded in Western Australia.

During the Great War in Europe between 1914 and 1918 Western Australian soldiers, sailors, airmen and nurses served with gallantry in all theatres of war. So enthusiastically did the families of the State commit their people to the war effort, that the Western Australian quota was exceeded by nearly four times. One local poet, 'Dryblower' Murphy, wrote:

'And into that mounded country
 Where the work of war was done,
 Where the blood-red trenches blur and
 blend,
 With no wav'ring, weak'ning,
 sigh I send
 My son,
 My son'.

Wherever they served, in the dry hills of Gallipoli or in the mud of France, the Westralian troops served with great distinction. They were so brave that they were often used as shock-troops—and they suffered the highest casualty rate of all the soldiers of the Empire. Many a grieving Perth mother cradled a damaged watch, a few coins, and maybe a photo of a son who had died 'For Freedom and Honour'. In time the people of Perth would erect in their honour a monument on the most prominent point of Kings Park, overlooking the city. The names of still others would be recorded on plaques pinned to the gum trees planted along the drives of the beautiful park, something which never fails to move visitors who see them. 'The Park' became a sacred place as well as a place of visual beauty and enjoyment.

Between 1920 and 1957 the population of Western Australia doubled to reach 695,000. In that time vast tracts of farming land north-east, east and south of Perth were opened up. Indeed it was claimed in the mid 1950s that Eric Smart owned the largest wheat farm in the world. The value of wheat exported increased from 2.5 million pounds in 1920 to 30 million pounds by 1957. And the value of wool exports grew from 4 million pounds in 1920 to 43.75 million pounds in 1957. Gold exports fluctuated wildly, but in 1957 reached 12 million pounds, with a (till then) all-time peak of 39 million pounds in 1961. These growth figures disguise the effect of the Great Depression of the 1930s, which saw exports plummet, building activity at a standstill and nearly one-third of the workforce unemployed. Even today there are families in Western Australia still scarred by the depression years. Many men who had taken up farming under soldier-settlement schemes had to walk off their hard-won properties in the 1930s. The land, as always in Western

Australian history, was less Eden-like than envisaged; and it was always hard to make a living from it. There was the constant menace of droughts, floods and fire. The Australian environment bred a tough countryman.

The Second World War (1939-45) also took its toll. This time Fremantle served as a submarine and refitting base for the American Navy and American servicemen enjoyed the hospitality of the Westralian people as they were to do again in the 1980s. After the War, Western Australia received many European refugees who contributed greatly to the life of the community. The 1950s are sometimes described as the 'age of affluence', but as ever there were those families for whom 'watching the pennies' was a way of life.

In 1962 Perth was host to the Empire Games. In some ways the Games were an affirmation of the old, Imperial connection, as were the Royal visits and the holiday on the Queen's birthday. But the Empire Games had a greater significance than this. Perth had won the right to hold the Games and Western Australia had become a jewel in the British Empire. And her athletes, like the sprinter-hurdler Shirley Strickland and the great miler, Herb Elliott, were of world renown. So too were her yachtsmen, for Rolly Tasker had won a silver medal in the Olympic Games in 1956.

All this seemed to presage the massive industrial and commercial boom which occurred in Western Australia from the mid 1960s. The fabulous nickel and iron ore discoveries sent share markets soaring. Investment in mineral development also led to the rebuilding of central Perth and, as population increased rapidly, to a surge of real estate development in the city and the new suburbs. By the late 1970s, the population exceeded one million people and by 1983 Western Australia had overhauled its old rival South Australia in population. The vigour and purpose of Western Australia in these years was embodied in the person of Sir Charles Court, Premier from 1974 to 1982, and before that Minister for Industrial Development in the Brand Government. In 1979 Court presided over the 150th anniversary celebrations of the foundation of the

State of Western Australia. 'He, like the Forrests and Stirling before him, embodied 'the spirit of place'. He began his career as an accountant. Other powerful men who emerged in this period like Lang Hancock, Garrick Agnew and Robert Holmes a Court; and many 'lesser millionaires', had equally spectacular careers. But Alan Bond the America's Cup hero of 1983, had the most spectacular career of all. An English migrant signwriter in Fremantle in the late 1950s to multi-millionaire by the 1970s, he seemed to be an affirmation of the ancient belief that in the '5th Climate' anything was possible. And if anyone any longer doubted that Western Australia was indeed Ophir—what with gold, iron ore, nickel, uranium and diamonds—they held their peace.

In the 1960s and 1970s the Americans came to Western Australia to invest in new farming lands, to develop the mineral industries, and to invest in city real estate. They came too in numbers to the Stirling Naval Base on 'rest and recreation', sometimes in nuclear-powered vessels. And they would return in 1987 in sailing vessels to wrest

from the Western Australians the cup they like to call The America's Cup. With the Americans coming, Alan Bond and his tough entrepreneur and sailing colleagues drew on the reserves of Western Australian pioneering experience but in the words of the Catalpa song of 1876:

'Now all the Perth boats were a-racing
Making hard tacks for the spot,
But the Yankee tacked into Fremantle,
And took the best prize of the lot'.

In 1988 Western Australians celebrate the bicentennial of European settlement of Australia. It will be a test of maturity and identity for all Western Australians.

REFERENCES

C.T. Stannage (ed.). *A New History of Western Australia*. University of Western Australia Press, 1981.

Westralian History Group. *On this side: Themes and Issues in Western Australian History*. Bookland, East Perth, W.A., 1985.

Chapter 2

PHYSICAL FEATURES AND GEOLOGY

The Geological and Geomorphological Framework of Western Australia

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Interest in the geology of Western Australia was spurred with the beginning of the mining industry in 1850 and has continued to the present. By 1986, when mining products were valued at over \$5,400 million for the year, the entire State had been mapped on a scale of 1:250,000 by the Geological Survey of Western Australia. This remarkable organisational achievement has provided a position to view the geological evolution of the western third of the continent in a global context. Furthermore, some 75 years after the pioneering work of J.T. Jutson, we now have the framework to develop the link between solid geology and *geomorphology*, and between geological evolution and *morphotectonics*.

The morphotectonic and geomorphological emphasis of this article differs from the more economic approach of previous Year Books. Readers requiring an introduction to the economic geology and mineral statistics of Western Australia can enter the literature through Collins and Baxter (1984), Ho and Groves (1987), Jaques et al. (1986) and Department of Mines (1987). Significant information is found in the issues of Australian Petroleum Exploration Association Journal (APEAJ) and the bulletins and other publications of the Geological Survey of Western Australia. The most comprehensive outline of the geology of the State is to be found in Memoir 2 of the Geological Survey, which is shortly to be succeeded by Memoir 3.

The geology and geomorphology is considered at two levels: (i) the scale of the continent; and (ii) the scale of individual geomorphological regions. Because large parts of Western Australia have undergone relatively uninterrupted subaerial weathering for so long, many aspects of their geomorphology are closely related to the solid geology. But, in addition, the depositional geomorphological sequences which, in Western Australia, were essentially controlled by global and regional climatic changes during

the Cenozoic, also need to be considered. These sequences include the extensive areas of desert dunes, such as in the great Sandy Desert, widespread river deposition and floodplain formation, such as along the Gascoyne and Fitzroy rivers, and Quaternary coastal deposits which dominate the geomorphology of the Swan Coastal Plain.

THE MAJOR GEOLOGICAL AND GEOMORPHOLOGICAL REGIONS OF WESTERN AUSTRALIA

The major geological and geomorphological regions of Western Australia are shown in Diagrams 2.1 and 2.2 and described in Tables 2.2 and 2.3. The geomorphology is essentially shown as 'landform regions', that commonly show some correspondence to the geological divisions. The general correspondence between geomorphology and solid geology is emphasised by the older elements of the geology of Western Australia, which are the main geographical components of the broad-scale geomorphology of the region. In this approach there is a danger of oversimplification, but it forms a convenient basis from which to discuss the geomorphology and geology of Western Australia.

For the general reader, a glossary of geological terms is provided at the end of the chapter, and a geological time-scale is given in Table 2.1. Words or phrases included in the glossary are italicised when first mentioned in the text.

TABLE 2.1 - GEOLOGICAL TIME SCALE

<i>Era</i>	<i>Period</i>	<i>Epoch</i>	<i>Duration (years)</i>	<i>Years before present</i>
Cenozoic	Quaternary	Holocene (Recent)	10,000	10,000
		Pleistocene	1.5-1.8 million	
	Neogene	Pliocene	3-5 million	5-7 m
		Miocene	19 million	
		Oligocene	11-12 million	
	Tertiary	Eocene	16 million	26 m
		Paleocene	10 million	
	Cretaceous	Maastrichtian Campanian Santonian Coniacian Turonian Cenomanian	35 million	64-65 m
		Albian Aptian Barremian Neocomian	36 million	
Mesozoic	Jurassic		54-59 million	136 m
	Triassic		33 million	190-195 m
	Permian		55 million	225 m
	Carboniferous		65 million	280 m
Palaeozoic	Devonian		50 million	345 m
	Silurian		35-45 million	395 m
	Ordovician		60-70 million	430-440 m
	Cambrian		70 million	500 m
				570 m
Pre-Cambrian Eras	Adelaidean		230-530 million	800-1,100 m
Proterozoic	Undifferentiated		250-550 million	1,350 m
	Carpentarian		450 million	1,800 m
	Early		700 million	2,500 m
Archaean			2,100 million	4,600 m

TABLE 2.2 GENERAL MORPHOTECTONIC - GEOLOGICAL DIVISIONS OF WESTERN AUSTRALIA
(To be used in conjunction with diagram 2.1)

<i>Area</i>	<i>Division</i>	<i>Subdivision</i>	<i>Diagram reference</i>
Western Shield	Yilgarn Block	Eastern Goldfields Province	1
		Southern Cross Province	2
		Murchison Province	3
		Western Gneiss Terrain	4
		Proterozoic rocks on or adjoining the Yilgarn Block	4 A-H
	Pilbara Block	Not subdivided	5
	Archaean inliers between the Yilgarn and Pilbara Blocks	Not subdivided	6
	Main areas of Proterozoic metamorphic and igneous rocks	Albany-Fraser Province	7
		Leeuwin Block	8
		Northampton Block	9
		Gascoyne Province	10
		Paterson Province	11
	Main areas of Proterozoic sedimentary rocks	Hammersley Basin	12
		Ashburton Trough	13
		Bangemall Basin	14A
		Nabberu Basin	14B
Remaining Precambrian areas	Kimberley region	Kimberley Basin	15
		Halls Creek Province	16
	Musgrave Block	Not subdivided	17
		Areas between region and the Kimberley Musgrave Block	18 A-D
		Proterozoic basins	
Phanerozoic areas	Sedimentary basins indicated on Diagram 2.1		19 A-C

DIAGRAM 2.1

Modified National Oceanic and Atmospheric Administration (NOAA) satellite image showing the general morphotectonic-geological divisions of Western Australia. The numbers refer to Table 2.2 where the subdivisions are named (modified from Geological Survey of Western Australia, Memoir 2). NOAA image courtesy of Remote Sensing Application Centre, Department of Land Administration.

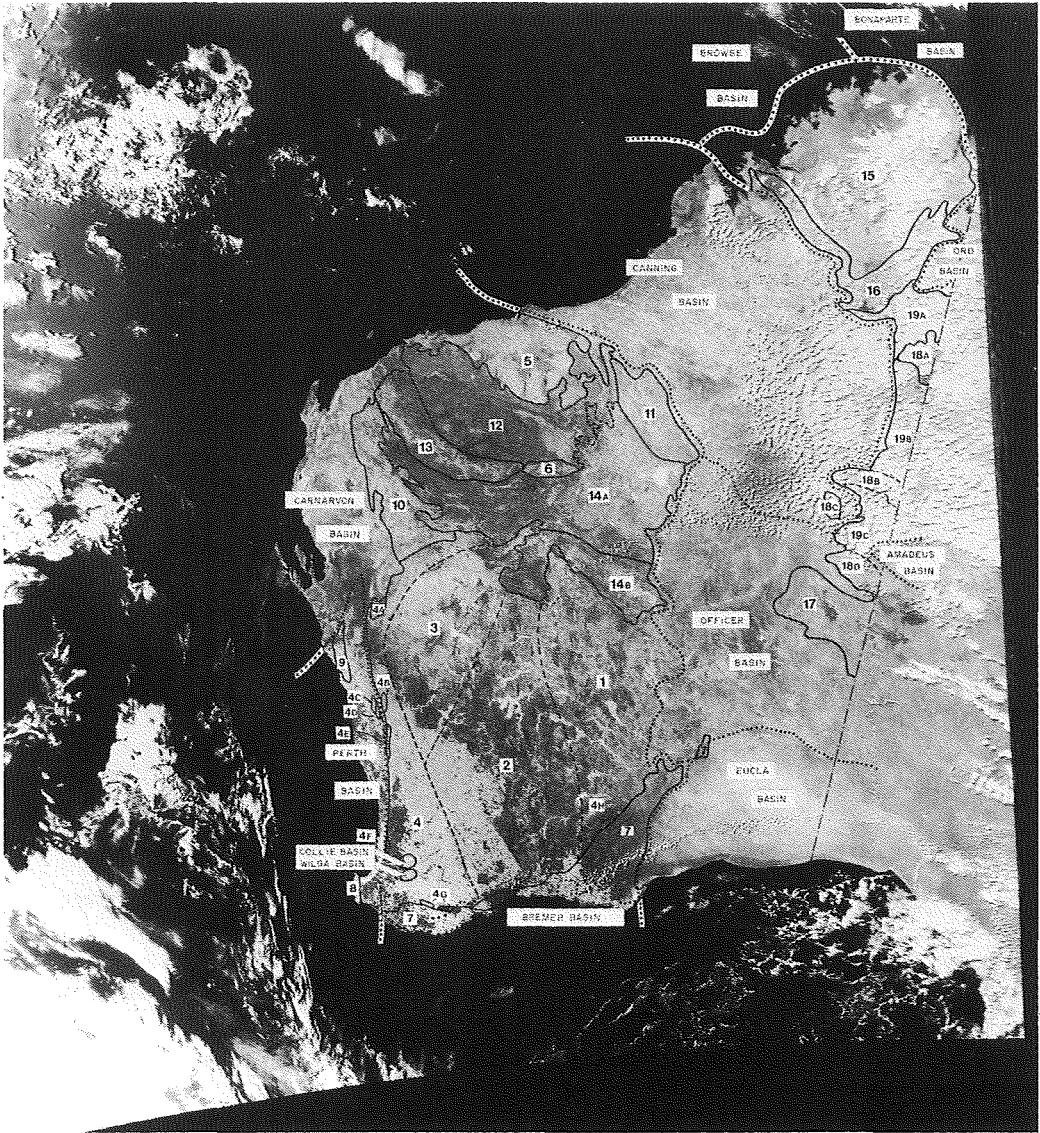


TABLE 2.3 - THE MAJOR GEOMORPHOLOGICAL DIVISIONS OF WESTERN AUSTRALIA

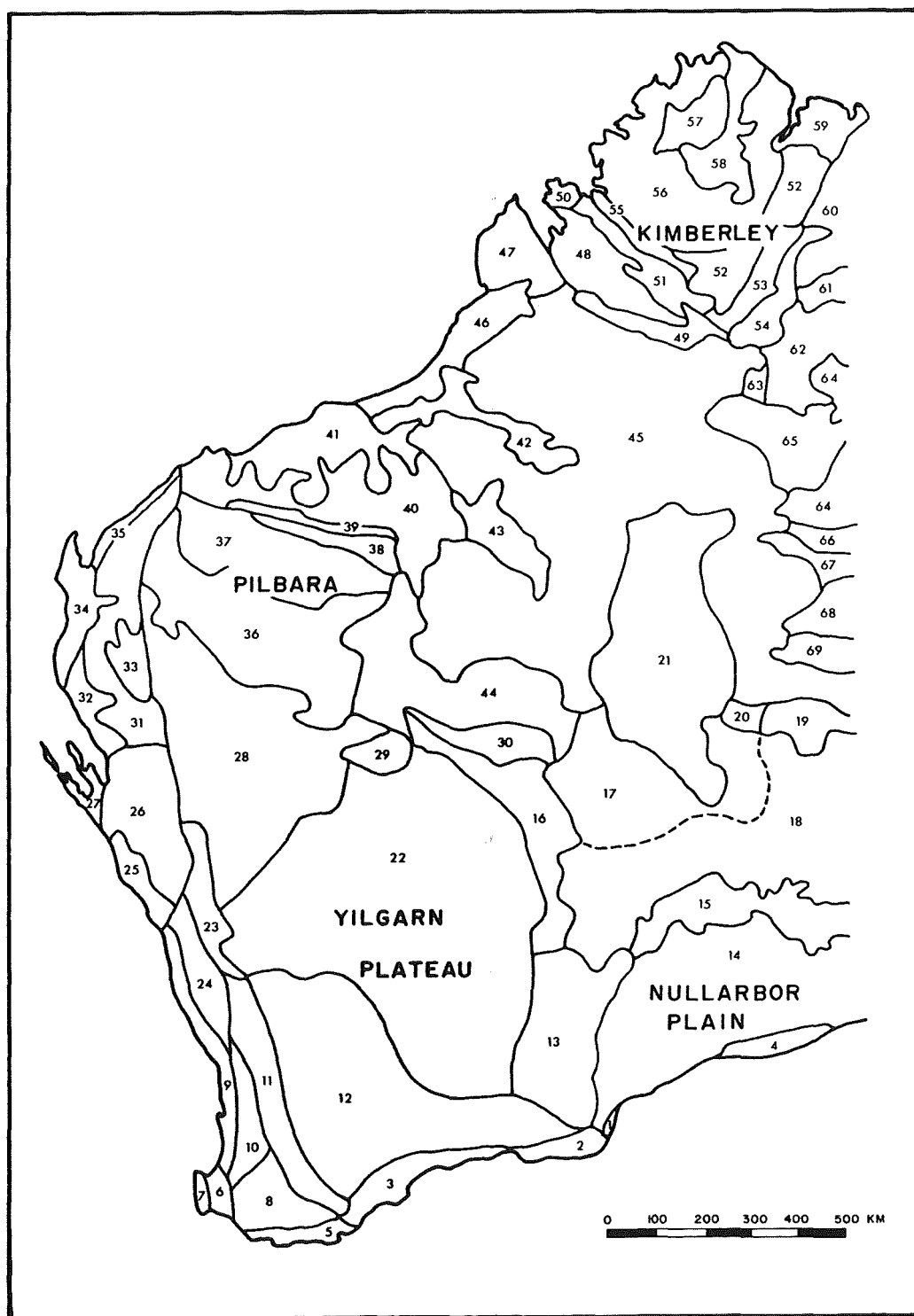
<i>Reference</i>	<i>Division and Description</i>	<i>Reference</i>	<i>Division and Description</i>
1	Israelite Plain— Narrow coastal plain with extensive dunes	18	Great Victoria Desert Dune Field— Main Dunefield - west-east longitudinal dunes
2	Esperance Hills— Low granite hills and plains extending as headlands and inlets	19	Musgrave Ranges— Granitic ranges and rounded high hills
3	Stirling and Bareen Hills— Hills and low ranges of granite and metamorphic rocks with intervening plains and moderately incised southerly valleys	20	Warburton Ranges— Ranges and hills of basic volcanic rocks and granite
4	Roe Plain— Coastal plain with extensive dunes	21	Gibson Desert Plains— Sandy or stony lateritic plains
5	Albany Headlands and Inlets— Granitic headlands and inlets with lagoons	22	Yilgarn Plateau— Sandplains and laterite breakaways; granitic and alluvial plains; ridges of metamorphic rocks and granitic hills and rises; calcretes, large salt lakes and dunes along valleys
6	Donnybrook Lowland— Lowland on down-faulted weak sedimentary rocks	23	Woodramung Hills— Low rounded ridges of folded metamorphics
7	Leeuwin Peninsula— Narrow granitic horst ridge with extensive cover of calcareous dune sands	24	Dandaragan Tablelands— Dissected plateaus and hills of sedimentary rocks, with minor laterite cappings and dry valleys; extensive sand cover in lower parts
8	Collie-Kalgan Slopes— Gently sloping dissected edge of plateau on granite and gneiss with laterite cappings	25	Greenough Hills— Dissected plateaus and hills of sandstone and shale, with extensive sand cover in lower parts
9	Swan Plain— Dune ridges, mainly of limestone, and inner alluvial plain	26	Yaringa Sandplain— Sandplain with minor dunes
10	Darling Range— High plateau rim with steep western fall; remnant laterite cappings and deeply incised valleys of oceanward drainage	27	Shark Bay Peninsulas— Peninsulas and islands formed by indurated limestone dunes
11	Northam Plateau— Flat-floored valleys of moderately incised oceanward drainage; older laterite remnants with breakaways on divides in east; shallow younger laterites on valley sides in west	28	Murchison Plateau— Mainly granitic plains with out-going drainage, broken by ridges of metamorphic rocks
12	Narrogin-Ongerup Plateau— Sandplains and laterite cappings with breakaways on divides; stripped granitic plains on valley sides; small salt lakes and bordering dunes along shallow lvalley floors	29	Glengarry Hills— Sandstone plateau sloping north to low hills of basic volcanic rocks
13	Coonana-Ragged Plateau— Sandplain and stripped gneissic plains with low hills of granite and metamorphic rocks; calcretes and scattered small salt lakes along shallow valleys	30	Carnegie Hills— Sandstone tablelands, stony limestone plains, salt lakes and adjacent dunes
14	Bunda Plateau— Covered karst plain of flat-lying limestone with closed depressions and caves; continuous cliff margin on south coast	31	Carnarvon Dunefield— South-north longitudinal dunes
15	Carlisle Plain— Sandstone plain with shallow closed depressions	32	Carnarvon Plain— Alluvial plain
16	Leemans Sand Plain— Sand plain with small salt lakes	33	Kennedy Range— Dissected sandstone plateau with partial lateritic cappings, covered by longitudinal dunes
17	Great Victoria Desert Dune Field— Northwest Dunes and Hills — west-east longitudinal dunes broken by low tablelands and ridges	34	North West Cape Ridges— Ranges and peninsula formed by folded sedimentary rocks and limestone dunes
		35	Onslow Plain— Alluvial, deltaic and littoral plains; minor islands
		36	Augustus Ranges— Parallel ranges and dissected plateaus with intervening sandy lowlands

TABLE 2.3 - THE MAJOR GEOMORPHOLOGICAL DIVISIONS OF WESTERN AUSTRALIA *continued*

<i>Reference</i>	<i>Division and Description</i>	<i>Reference</i>	<i>Division and Description</i>
37	Hamersley Plateaus— Dissected bold plateaus and ranges in flat lying or moderately folded sedimentary rocks	54	Halls Creek Ridges— Ranges and rounded hills on granite and metamorphic rocks
38	Fortescue Valley— Mainly alluvial lowland	55	Richenda Foothills— Rounded hills and ridges and lowlands on a belt of granite and folded metamorphic rocks with minor basalt
39	Chichester Range— Narrow range of dipping quartzite and sandstone	56	Kimberley Plateau— Sandstone plateaus with tabular high summits; ria coast and islands to north-west
40	Nullagine Hills— Dissected flat-topped hills of granites and metamorphic rocks with partial lateritic cappings; narrow estuarine plain and islands	57	Couchman Uplands— Undulating to hilly lower plateaus, mainly on basalt
41	De Grey Lowlands— Floodplains and deltaic plains; granitic and limestone lowlands; scattered ranges of metamorphic rocks in north	58	Drysdale Lowlands— Undulating to hilly lowlands, mainly on basalt
42	Anketell Hills— Low mesas, buttes and stony rises of lateritized sandstone and shale among east-west longitudinal dunes and sandy plains	59	Bonaparte-Diemen Lowlands— Dissected lateritic lowlands and minor islands; part alluvial, part estuarine coastal plains
43	Rudall Tablelands— Dissected low sandstone tablelands	60	Ord-Victoria Plateaus— Dissected plateaus, mainly basaltic but partly of sandstone and with local lateritic cappings
44	Stanley Hills and Dunes— Isolated sandstone ridges among west-east longitudinal dunes and sandplain	61	Birrundudu Plain— Low basaltic plain with clay soils; indeterminate drainage with large claypans
45	Great Sandy Desert Dunefield— East-west longitudinal dunes and minor salt lakes	62	Tanami Sandplain and Ranges— Sandplain with scattered low ranges and tablelands and occasional granitic hills
46	Eighty Mile Plain— Coastal dunes and estuarine plain	63	Sturt Creek Floodout— Floodout with distributary channels and claypans
47	Dampier Tablelands— Low sandstone tablelands, partially lateritized and with extensive sandplain cover	64	Wiso Sandplain— Sandplain with minor longitudinal dunes in South; floodplains and floodouts on margins; stony rises in North
48	Fitzroy Plains— Floodplains and broad estuarine plains	65	Stansmore Dunefield and Ranges— East-west longitudinal dunes locally broken by narrow sandstone ranges
49	Fitzroy Ranges— Scattered sandstone tablelands and ranges; extensive sandplain and east-west longitudinal dunes	66	Redvers Dunefield— East-west longitudinal dunes
50	Yampi Peninsula— Parallel ridges of quartzite and sandstone and narrow valleys of basalt; extending as a ria coast and islands	67	Macdonald Sandplain— Mainly sandplain with dune-fringed salt lakes
51	Napier Limestone Ranges— Limestone tableland and intricately dissected bevelled ridges; rocky karst surfaces with box valleys	68	Amadeus Lowland— Dunefields and sandplains with scattered sandstone ranges; salt lakes and calcrete plains along lowland axis
52	Leopold-Durack Ranges— Prominent ranges of dipping quartzites rimming the main plateau	69	Rawlinson-Petermann Ranges— Dissected sandstone ranges with prominent escarpments
53	Springvale Foothills— Granite hills and minor undulating plains		

DIAGRAM 2.2

The major geomorphological divisions of Western Australia. The numbers correspond to those given in Table 2.3 (after Jennings, J.N. and Mabbutt, J.A., 1986: in Jeans, D.N., (ed), Australia - a geography volume one. The natural environment).



MORPHOTECTONIC TERRAINS AND GEOMORPHOLOGY

The Precambrian framework

The geomorphological contrast of Western Australia with other continental masses is based upon the lack of Phanerozoic *orogeny*, and particularly Late Phanerozoic *orogeny*. In fact, large parts of Western Australia have been relatively stable for over 1,000 million years. However, little remains of the original landsurfaces, and the regions have been so reduced in their relief as to lose much of their erosional potential (Diagram 2.3).

The antiquity of the landsurface of Western Australia is exemplified by the Yilgarn Block, which with the Pilbara and Kimberley Blocks formed the geological framework of Western Australia, and controlled much of the long-term geological and broad-scale geomorphological evolution of the State. The Yilgarn Block is one of the largest areas of Archaean crust in the world. The bulk of the block—the Murchison, Southern Cross and Eastern Goldfield divisions—is a *granite-greenstone* terrain, in which arcuate belts of *metamorphosed* sedimentary and volcanic rocks (greenstone belts) lie between large areas of granitoid. High-grade *gneiss* terrains bound the western margin of the block. The *gneiss* terrains represent metamorphosed, and partly *migmatized*, *metasedimentary* sequences. Dates from detrital zircons have yielded ages of up to 4,200 million years, and represent the oldest mineral ages reported for terrestrial rocks. For the rest of the Yilgarn Block a large number of dates have been obtained. *Komatiite* lava flows in the eastern part of the block have been dated at 3,200 million years ago and *felsic volcanics* at around 3,000 million years ago. Recent rubidium-strontium dating for the Murchison gave ages of about 2,500 million years for a granite intruded by *porphyritic-biotite adamellite*.

The geomorphology of the Yilgarn Block is essentially one of an erosional plain, in which lithological differences and major *tectonic* lineaments are accentuated in their erosional expression. Not surprisingly, the resistant banded iron formations often form prominent ridges. Similarly, large granite domes are prominent features in the western

areas of the Yilgarn Block. Even the larger *dykes* (e.g. the Jemberlana Dyke, of the Norseman region) have a clear topographic expression. Other regional-scale lithological differences are also well marked topographically, for example, the paired metamorphic belts of the Perth-Northam area, which are related to the Northam Plateau.

The western margin of the Yilgarn Block is demarcated by the Darling Fault, which has existed since the Late Proterozoic or Early Palaeozoic. It probably originated as a *transcurrent* fault, but later functioned as a normal fault with a maximum throw of about 15,000 metres. In the Donnybrook area, the Donnybrook Sandstone and Maxicar Beds abut against the Darling Scarp and extend into valleys incised into the scarp. These sediments are of Neocomian age, and are believed to have been deposited at about the time of the last major movement along the Darling Scarp. As a morphotectonic structure, bounding a continental margin, the Darling Scarp (Diagram 2.4) forms one of the 'Great Escarpments' of the world.

Unlike the Yilgarn Block, the Kimberley Block is largely covered by the later Proterozoic sediments and volcanic rocks which form the Kimberley Basin, and consequently little is known of its geology. It is known however, that the block has remained stable for 2,100 million years. The geomorphology of the Kimberleys is dominated by a series of plateaus on which major structural lineaments have strongly controlled drainage net evolution. Surficial depositional elements are generally suppressed, but important Cenozoic *alluvial* sequences are found, some of which contain diamonds.

The Pilbara Block consists of large granitoid *batholiths*, some 3,000 to 3,500 million years old, associated with older greenstone belts and younger granites and adamellites, dated at around 2,800 million years ago. The southern part of the Pilbara Block is overlain by the Fortescue Group of the Hamersley Basin (see below) which is dated at 2,700 million years ago, suggesting that major stabilisation had by then taken place. The geomorphology of the block is characterised by erosional plains, in which lithological variations are clearly expressed. The corestone plains and granite domes reflect the large batholiths.



DIAGRAM 2.3

A computer-generated digital terrain model showing the differences in relative relief between Western Australia and the eastern part of the continent (courtesy of Remote Sensing Application Centre, Department of Land Administration).

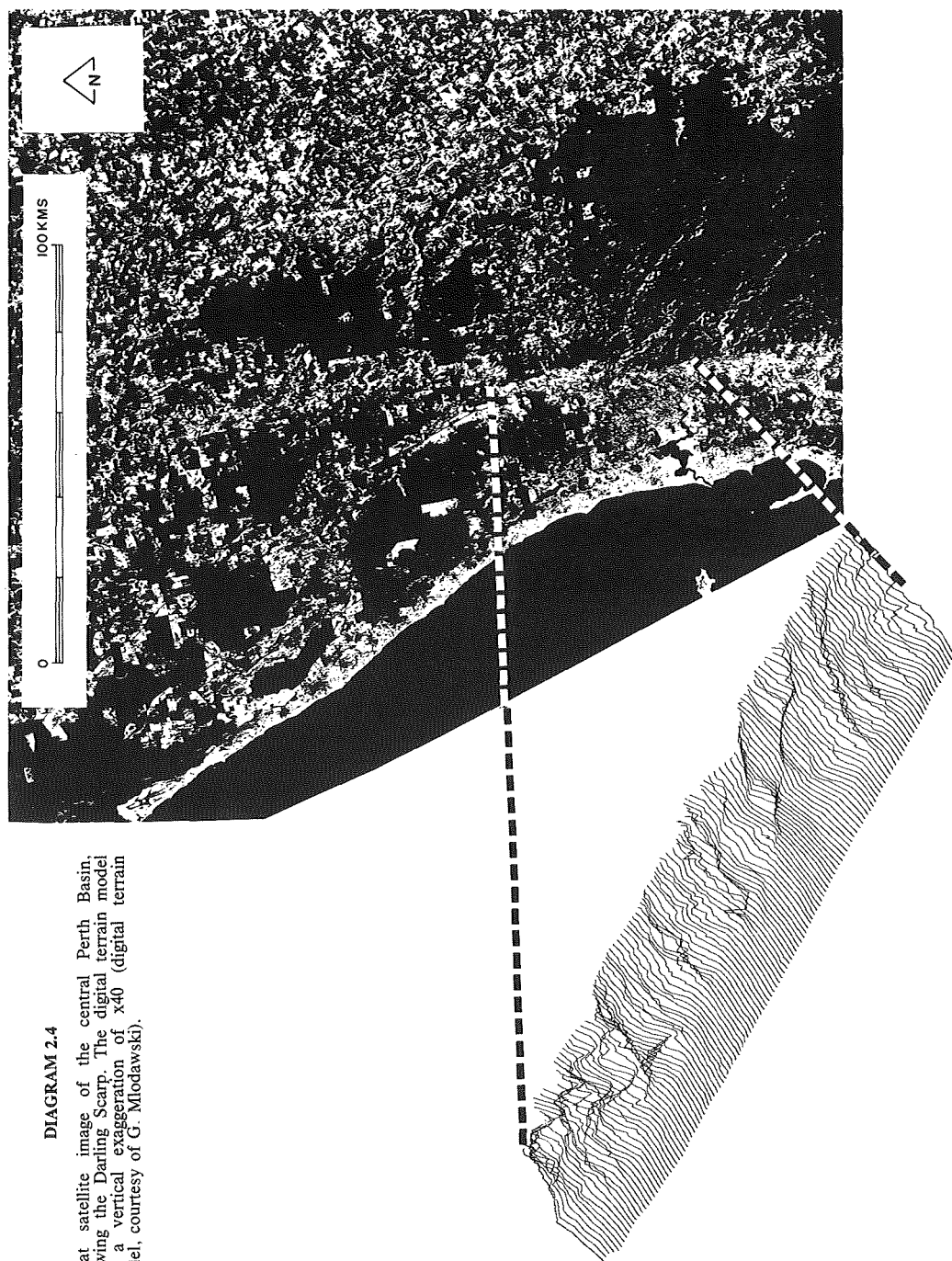


DIAGRAM 2.4

Landsat satellite image of the central Perth Basin, showing the Darling Scarp. The digital terrain model has a vertical exaggeration of x40 (digital terrain model, courtesy of G. Mlodawski).

The Proterozoic saw the development of a number of block-marginal *mobile belts* and the formation of *sedimentary basins* which led to the deposition of an intracratonic platform cover. The main stratigraphic divisions of the Hamersley Basin, which is the oldest, are:

1. The basal Fortescue Group (mentioned above), which consists largely of volcanics—flood *basalts*, *andesites* and *tuffs*—and subordinate sedimentary clastics;
2. The Hamersley Group which contains the classic banded iron formation, shales and dolomites, extensive dolerite *sills* and large volumes of acid volcanics;
3. The Turee Creek Group, the upper part of which is dominated by a series of sedimentary clastics, including *diamictites*, carbonates and subordinate dolerites and volcanics.

The deposition of the basin infill straddles the Archaean/Proterozoic boundary (2,500 million years ago). The Hamersley Basin itself was probably *cratonised* by around 2,000 million years ago.

The geomorphological continuity of the Hamersley Basin is interrupted by the Fortescue Valley (a possible *graben*), in which alluvial deposition has taken place. Large alluvial fans debouch out of the bounding escarpments into the valley. To the north of the Fortescue River, the Chichester Range is the geomorphological expression of the Fortescue Group. To the south, the Hamersley Group forms a strongly defined, dissected plateau, on which structural and lithological controls have developed a distinctive terrain (Diagram 2.5) associated with some large landslides (Diagram 2.6).

The Gascoyne Province and Ashburton Trough are the two elements of a complex orogenic zone or mobile belt—the Capricorn Orogen—joining the Pilbara Craton to the Yilgarn Block. In the northern part, the orogen consists of folded geosynclinal sediments of the Ashburton Trough. The major structural elements are indicated by the ridge arrangement of the erosional geomorphology. The Ashburton Trough grades into the Gascoyne Province with increasing metamorphic grade and associated *plutonic* rocks. Overall, the formation of the Capricorn Orogen involved geosynclinal sedimentation, metamorphism, basement

reworking and granitoid emplacement. The oldest dates obtained for the Gascoyne Province have been 2,000 to 2,400 million years ago. A younger set of granites have been dated at 1,600 million years ago; the orogen probably did not finally stabilise until about 1,000 million years ago.

The Nabberu Basin consists of a thick sequence of sedimentary rocks—essentially underformed clastics, iron-formation and carbonate sediments—associated with minor igneous rocks. The sequences are Proterozoic, and dates of 1,600 to 2,000 million years ago have been obtained. In the western part of the basin there was some deformation 1,700 to 1,800 million years ago, associated with the remobilisation of, and intrusions in the Gascoyne Province. The Nabberu Basin may have been an aulocogen—a continental rift which failed to develop fully—related to the *tectonics* of the Gascoyne Province.

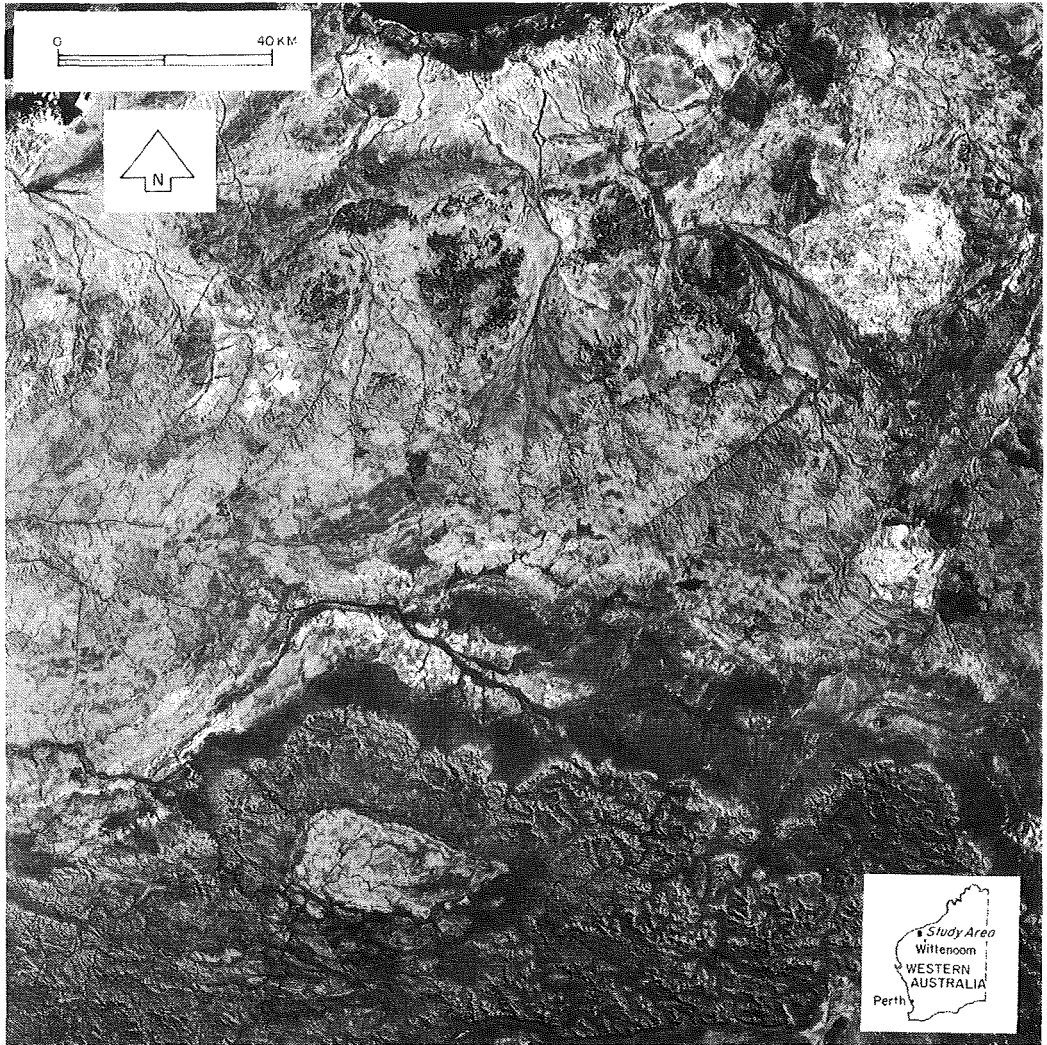
The Bangemall Basin is a large intracratonic sedimentary basin dated at 1,100 million years ago. The succession consists of graben deposits overlain by marine *transgressive-regressive* units and stable platform deposits. The western part of the basin was influenced by tectonic activity associated with the Gascoyne Province. *Mafic* and felsic volcanic activity is evident throughout the basin, but is most pronounced in the west.

In both the Nabberu and Bangemall sedimentary basins, the geomorphology is closely controlled by the geology. Sand dune development is widespread. The major *playa* systems of Lakes Gregory, Nabberu, Teague, Carnegie and Wells are important depocentres in the regions; and especially Lake Carnegie, where large amounts of clastic sediments are at present being supplied to the playa. Some of these clastics result from the extensive stripping of the Permian sediments of the area which reveals older landsurfaces.

The Albany-Fraser Province is a mobile belt which delimits the southern part of the Yilgarn Block. It has been dated as being 1,200 to 2,100 million years old. Along the western margin of the Yilgarn Block the basement is generally concealed by a thick sequence of Phanerozoic sediments, and is only exposed in the Naturaliste and Northampton Blocks. Dates of 1,700 to 2,000 million years ago have been obtained for the

DIAGRAM 2.5

Landsat satellite image showing the contrast in the geomorphological expression of the Pilbara Block (the northern part of the scene) and the Hamersley Basin (the southern part of the scene).

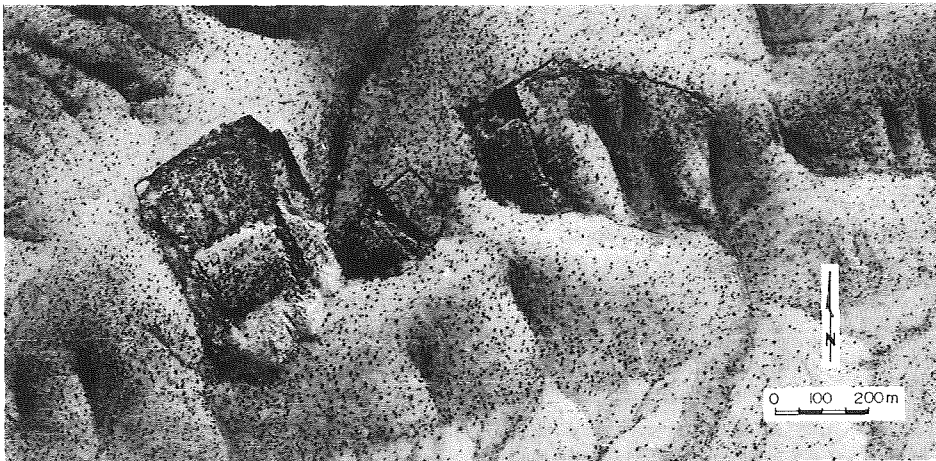
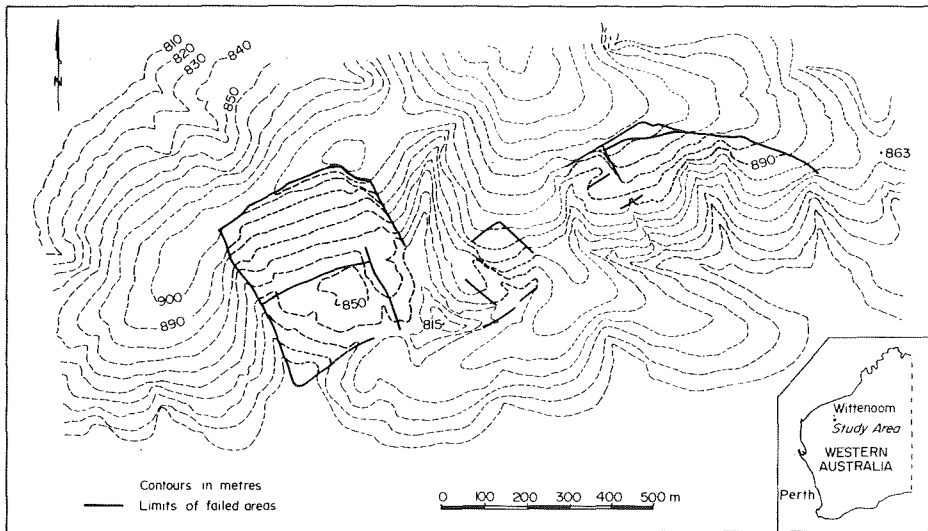


Northampton Block and the Proterozoic basement under the Perth Basin. A granulite metamorphic event dated at 644 million years ago has been recognised in the Naturaliste Block. Little is known about the age and detailed geology of the Paterson Province, which is a Proterozoic mobile belt delimiting the eastern margins of the Pilbara Block.

The Kimberley Block and bounding Halls Creek and King Leopold mobile zones of north-western Australia are part of the wider North Australian Craton. These mobile belts have a very pronounced geomorphological expression (Diagram 2.7). The Halls Creek Mobile Zone is an Early Proterozoic geosynclinal sequence of sediments dated 2,100 million years ago, which have undergone

DIAGRAM 2.6

Large planar rock slides in the Hamersley Basin. The westernmost slide has a volume of just under 1 million cubic metres, and during failure attained sufficient momentum to override an opposing ridge.



high-grade metamorphism and are associated with dolerites, *ultrabasics* and *syntectonic* granites. This phase of tectonism spanned the interval 1,900 to 1,800 million years ago, after which the belt was cratonised. The King Leopold Mobile Belt is generally thought to correspond in both age and origin to the Halls Creek Mobile Zone. However, there is also evidence of intense folding in the King Leopold Mobile Zone around 600 million years ago.

By the end of the Precambrian the morphotectonic framework, which was to control much of the future geological evolution of Western Australia, was essentially in place (Diagram 2.8). In this framework the Yilgarn and Pilbara Blocks and the associated mobile belts and sedimentary basins, are now combined and constitute the Western Australian Shield. The Shield was to remain the dominant morphotectonic element of the geology of Western Australia, and

from at least the end of the Precambrian, large parts of this region were to remain as relatively stable landsurfaces.

Palaeozoic history

Present understanding of the Early Palaeozoic morphotectonic development of Western Australia is incomplete. However, it is clear that at that time Australia was part of the Gondwana supercontinent, and that during the Early Cambrian, Gondwana generally experienced continental drift and seafloor spreading. In the region which was to become the north-west margin of Australia, plates diverged, releasing extensive *tholeiitic* flood basalts. During the Cambrian, marine deposition took place in the Bonaparte Gulf and Ord Basins. By Ordovician times the sea covered large parts of the Canning, Amadeus and Bonaparte Gulf Basins. Marine incursions probably also affected the Browse, Ord and Officer Basins, but only in the Silurian did marine deposi-

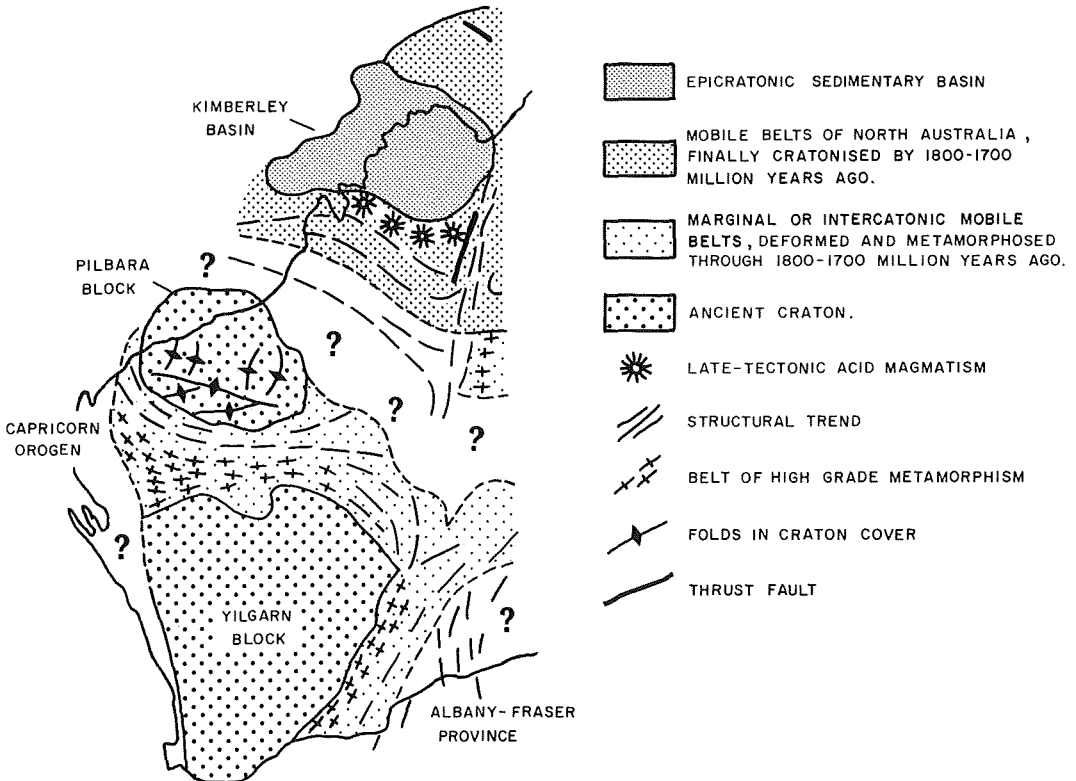
tion extend as far south as the Carnarvon and northern Perth Basins. The southward migration of marine deposition with time may reflect the progressive southward opening of a divergent margin, with the development of failed arms off it.

During the Middle and Late Devonian, marine conditions prevailed over much of the Canning, Carnarvon, Bonaparte Gulf and Ord Basins and extensive coral reef complexes formed. In the northern Canning Basin the present Napier and Oscar ranges developed as fringing, barrier and atoll reef complexes during the Late Devonian. Today these form limestone ranges, which still reflect much of their original geomorphological expression and clearly show the original reef facies. *Karst* forms are well developed in some of the more massive limestone.

During the Early Permian, regions which were to contain the northern and western margins of Western Australia subsided, and

DIAGRAM 2.8

The geological framework of Western Australia during the Middle Proterozoic (adapted from Clark, I.F. and Cook, B.J., 1983: Perspective of the Earth, Australian Academy of Science).



extensive deposition occurred in the sedimentary basins. Widespread glaciation throughout much of Western Australia at this time is well documented. Glacial sediments are widely found in a stratigraphic context in the sedimentary basins, from Collie in the south to the Bonaparte Gulf in the north, but outliers of glacial deposits are also known on the Precambrian Shield, which indicate that the Early Permian ice sheet covered much of present-day Western Australia. An ice-cap covering an area of as much as 2.5 million square kilometres is possible but this is not to suggest that it was continuous. For the geomorphological development of Western Australia, Permian widespread glaciation was important. It provided a fresh start for surface denudational processes—just as the Cenozoic ice age has removed much of the weathered *mantle* that had previously covered the Canadian Shield. Similarly *isostatic* adjustments had important geomorphological repercussions. It is not, however, at all certain that any large glacial erosional forms remain in the present landscape of Western Australia.

The marine sediment sequences of the Permian were deposited in broad basins, but at the end of the Permian the depositional basins began to assume a more linear form. This change in style of the environment of deposition was associated with faulting and the development of rift valleys, so that deposition was now along axes which were to parallel the present continental margin.

Mesozoic: rifting and the development of the continental margins.

Along the present western margin, the Triassic saw the development of graben structures, which controlled deposition. Sedimentation began with a marine transgression, which was short lived near its southern limit but lasted longer further north. Grabens were active particularly in the Late Triassic, and accumulated over 3 kilometres of terrigenous clastic sediments in the Perth Basin, and over 4 kilometres on the central south-western part of the Exmouth Plateau.

During the Jurassic, sedimentation continued essentially uninterrupted along the western margins, but graben development was less active than in the Triassic. During the Early Jurassic, coal measures were deposited in

the Perth Basin, and in the Middle Jurassic a marine transgression extended as far south as the northern part of the Perth Basin. That was when Gondwana began to breakup, with a mid ocean spreading ridge entering the north-west coast of Australia. From the Late Jurassic on, most sedimentation off north-western Australia occurred in a marine environment. The Perth Basin underwent renewed graben development in the Late Jurassic, and this was the forerunner of a later episode of rifting.

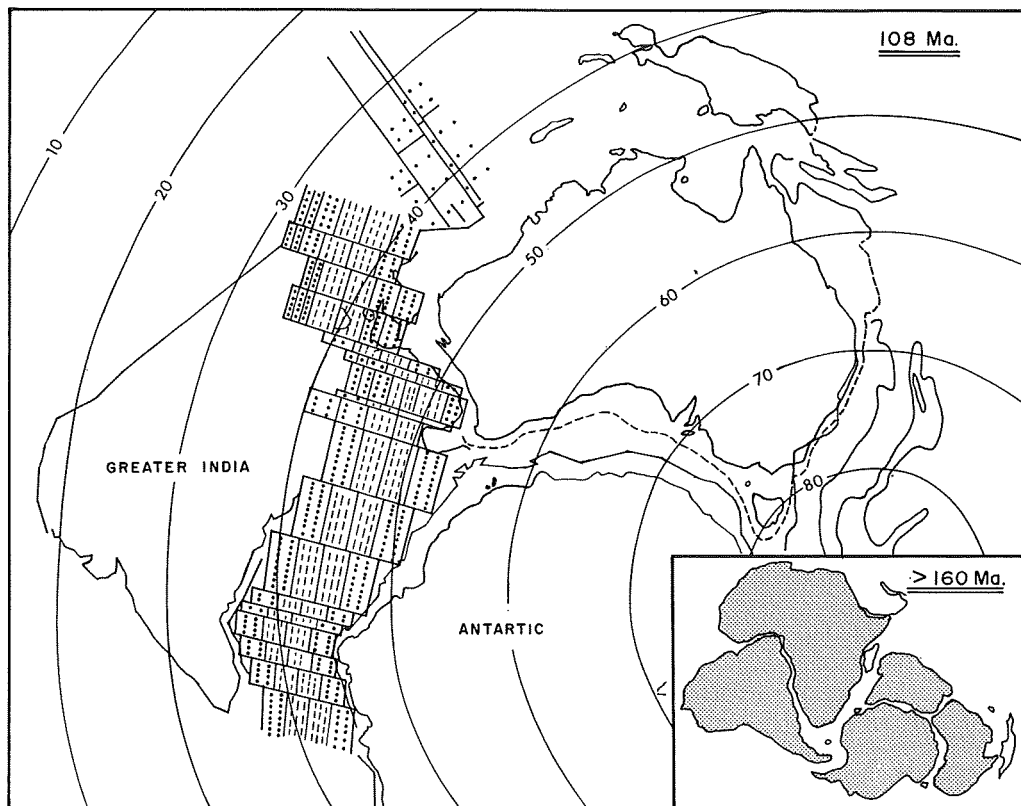
During the Cretaceous the coastal margins of Western Australia began to take on much of their present form. The strong Late Jurassic graben faulting had significantly diminished by the beginning of the Neocomian. In the Early Cretaceous, tensional tectonics between Australia and Antarctica led to the formation of a large downwarp which was to become the Eucla Basin. Along the western margin, the area between the Naturaliste Plateau and the Exmouth Plateau was probably still linked to Greater India. But during the mid-Neocomian, a mid-ocean ridge developed between Australia and Greater India, accompanied by widespread uplift. At the same time India moved away from Australia and the separation has continued to the present day (Diagram 2.9). From the time of the breakup (127 million years ago) until the Early Tertiary (53 million years ago), Australia and India were separated by mid-ocean ridge spreading systems and were thus on separate *lithospheric* plates.

During the Aptian to Albian a marine transgression affected large parts of Western Australia (Diagram 2.10). Sediments of this age are widespread in the Canning, Perth, Carnarvon, Officer and Eucla Basins. An interval of uplift and erosion followed in the Perth Basin. In the southern part of the Perth Basin basalts then erupted and covered extensive parts of the landscape. The development of basalt flows was linked to thermal controls on rift development in the Perth Basin at the time, as was activity along the Darling Fault.

The Late Cretaceous was again marked by a marine transgression, but the conditions controlling deposition along the western margin were quite different from those of the Early Cretaceous. Sediments deposited in the Late Cretaceous are dominated by

DIAGRAM 2.9

Greater India and Australia at 108 million years ago (Ma). The stippled pattern between the two continents indicates the magnetic signatures. The northwest-southeast trending structure is the Argo Abyssal Plain, in which earlier sea floor spreading had taken place. The inset shows Gondwana before rifting (adapted from Veevers, J.J., (ed) 1984: Phanerozoic earth history of Australia.).



biogenic carbonates, with only a minor influx of terrestrial clastics and generally low sedimentation rates, features which characterise the sedimentation regime of much of the western margin up to the present and reflect the negligible supply of detrital sediments from the low-relief hinterland.

During the Late Cretaceous, the southern margin of Australia was controlled by a series of graben structures parallel to the coast. However, these were less pronounced along the southern margins of Western Australia, and here Late Cretaceous sedimentation was largely restricted to the Eucla Basin.

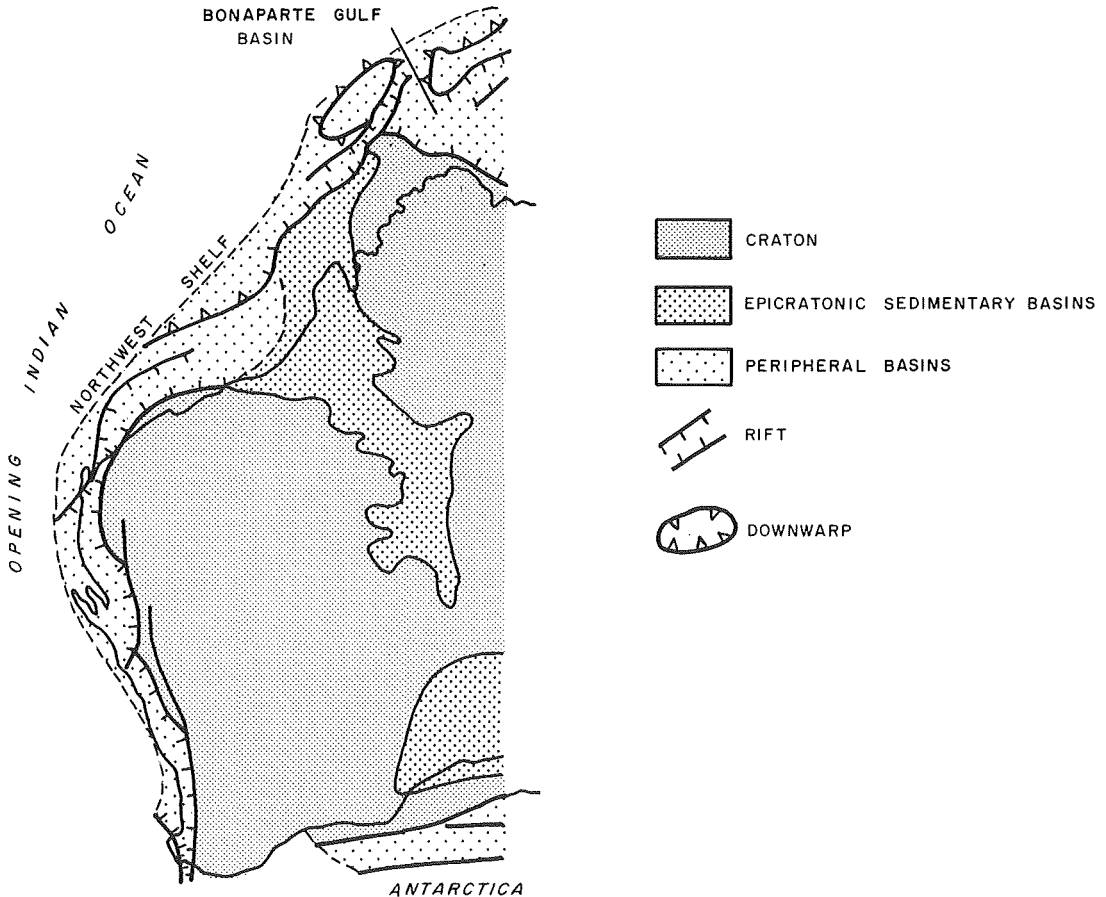
The relationship of deposits of Cretaceous age to the present geomorphology indicates

that major elements in the landscape may be older than 100 million years. From the distribution of Late Cretaceous sediments it is clear that some of the present valleys, which cut through the scarps of the Darling and Dunsborough faults, were already in existence at that time. There is similar evidence that the lower Murchison River valley may have existed in the Cretaceous.

Evidence of the upstream extension of Triassic sediments along the Greenough River valley suggests that some of the drainage in the southern Carnarvon Basin/northern Perth Basin may have existed in the Triassic. Large playa systems with complex depositional and marginal deflation features are widespread in Western Australia. They are frequently related to a network of palaeochannels which were probably active

DIAGRAM 2.10

The geological/morphotectonic setting of Western Australia during the Early Cretaceous (adapted from Clark, I.F. and Cook, B.J., 1983: Perspective of the Earth, Australian Academy of Science).



during the Late Cretaceous. From the combined evidence it is clear that major elements of the geomorphology of Western Australia are much older than generally accepted for other parts of the world. In fact, it seems that some elements of the geomorphology of the present landsurface may have survived the breakup of the Gondwana supercontinent.

Cenozoic: the development of the present landsurface

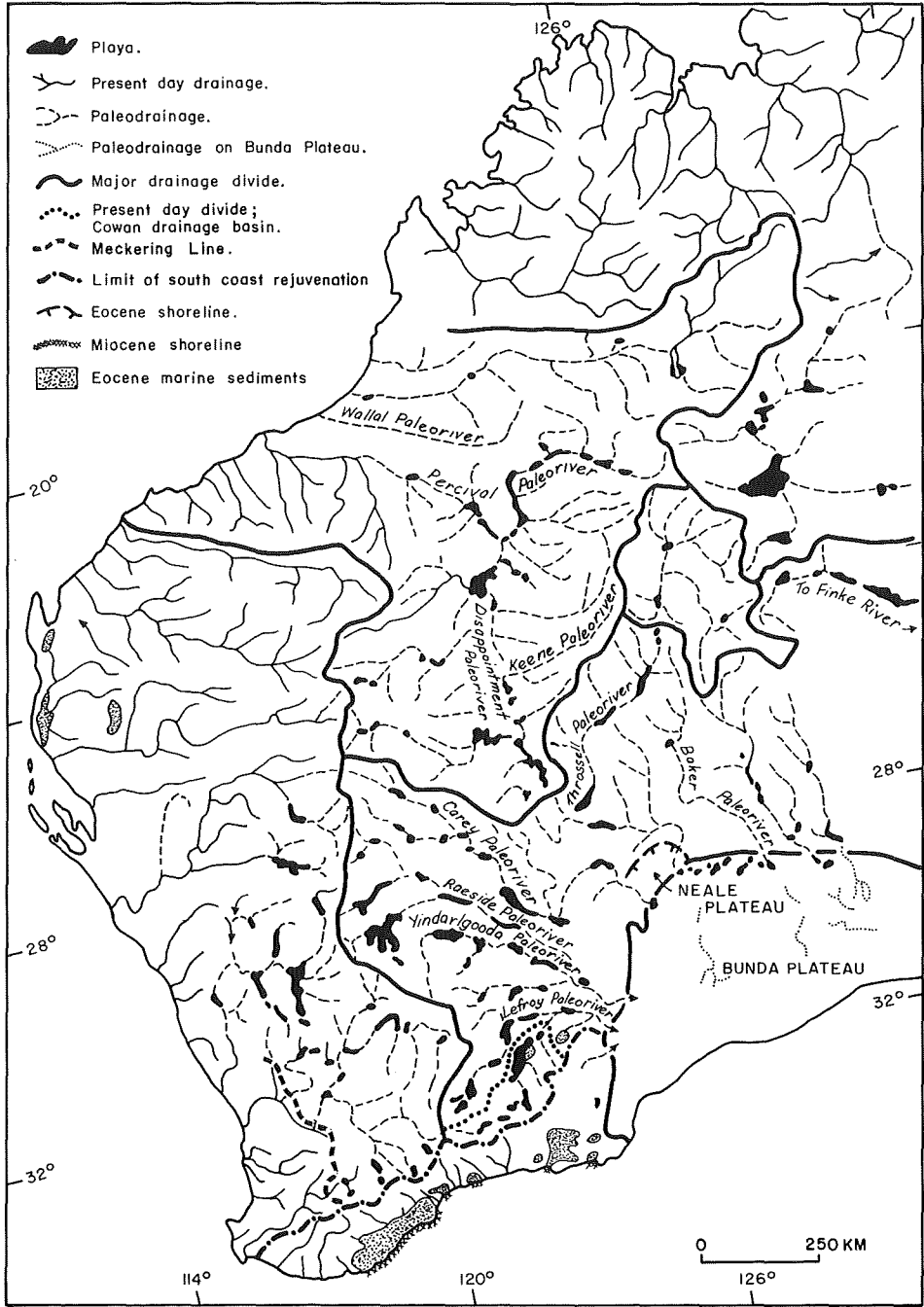
The morphotectonic framework of Western Australia was in place by the beginning of the Tertiary, but nevertheless, marine trans-

gressions during the Paleocene, Eocene and Miocene significantly modified large areas of the western and southern margins of Western Australia (Diagram 2.11).

The Eocene saw marine transgressions extending into the western and southern coasts of Western Australia. In the middle Eocene, shallow seas penetrated into the Eucla Basin, and during the Late Eocene extended north of Norseman. The Bremer Basin, with its characteristics siltstone, *lignite* and *spongolite*, is a product of the Late Eocene transgression. These sediments were deposited over an irregular landsurface of Precambrian rocks, like that now found in the

DIAGRAM 2.11

Major palaeochannels and Tertiary marine sediments and shorelines. The Meckering Line separates the poorly defined streams of the inland region from the more incised coastward draining rivers. The limit of rejuvenation along the south coast is related to the Ravensthorpe Ramp (from Van de Graaff, W.J.E., Crowe, R.W.A., Bunting, J.A. and Jackson, M.J., 1977: Zeitschrift für Geomorphologie, 21).



Esperance area. Marine platforms, which formed during the height of the Late Eocene marine transgression, are still evident along some Precambrian uplands, which rise above the Tertiary sediments.

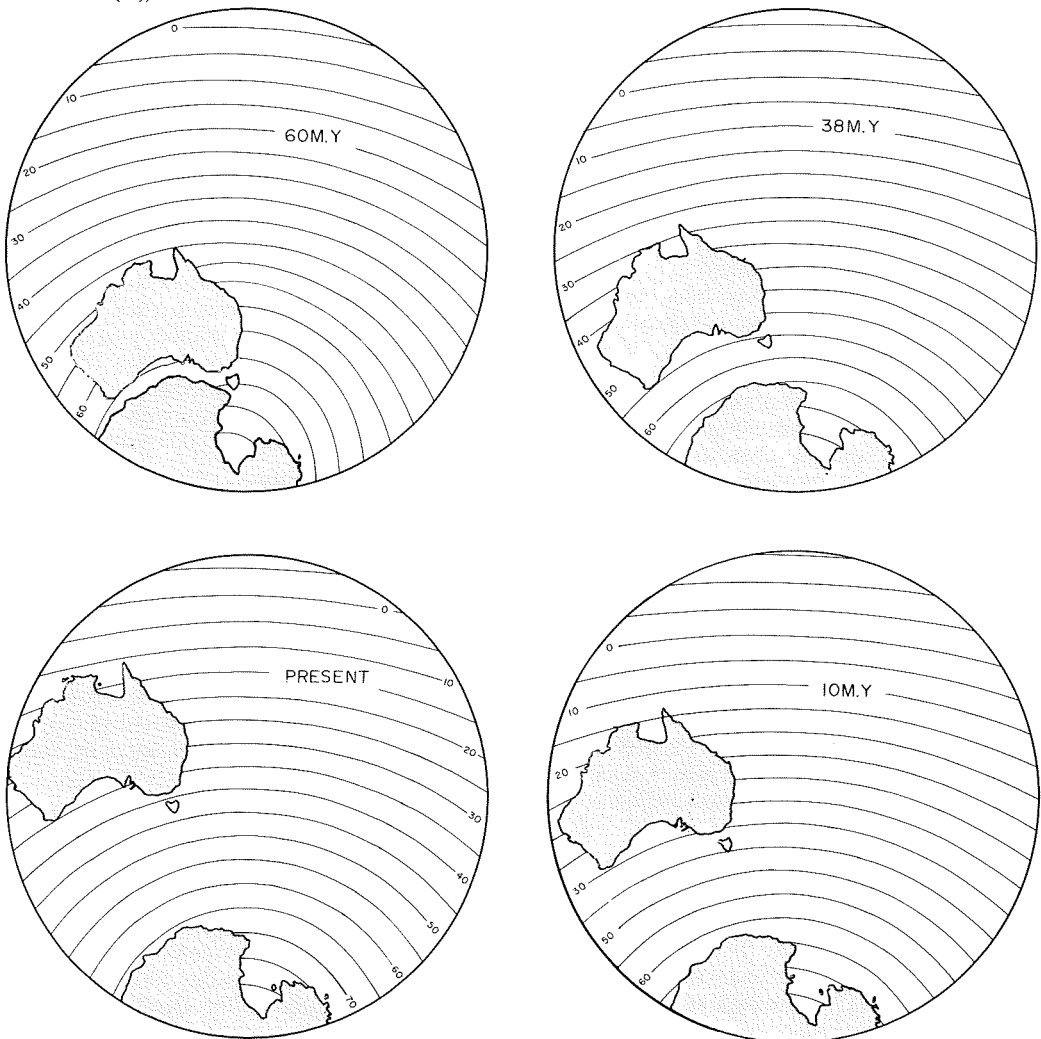
The Miocene saw extensive carbonate deposition in both the Eucla and Carnarvon basins. Today Miocene limestones dominate the surface geology of the Eucla Basin, and provide the setting for one of the classic karst regions of the world.

Although the morphotectonic framework of Western Australia was established by the Early Tertiary, the details of the geomor-

phology of the landsurface were still quite different from those of today. This is evidenced by the existence of an extensive paleochannel network which is thought to have been still active at that time (Diagram 2.11); and climate generally was quite different from that of today. The occurrence of the mangrove palm, *Nipa*, in the Eocene Kings Park Formation suggests that sea surface temperatures may have been as warm as 20°C to 25°C, significantly warmer than today. Pollen in Late Eocene sediments show that over southern Western Australia the vegetation resembled tropical to sub-

DIAGRAM 2.12

The position of Australia during the Cenozoic (after Crook, K.A.W., 1981: in *Ecological Biogeography of Australia*. A. Keast (ed)).



tropical rainforest. Similar conditions prevailed over southern Western Australia throughout much of the Oligocene. Early Miocene precipitation was probably high, but more arid conditions set in during the Middle Miocene. By the Late Miocene the arid climates that today prevail over much of Western Australia, had been established, and Australia had essentially reached its present geographical position (Diagram 2.12).

The wet climates of the Early and Middle Tertiary were conducive to deep weathering; and this is likely to have taken place during the Eocene, but certainly by the Oligocene and Early-Middle Miocene. Deep weathering resulted in a weathered *regolith* and extensive *laterite* formation. The landsurface of much of Western Australia bears a strong imprint of the deep weathering event of the Tertiary, and its control on subsequent geomorphological development is well manifested in etchplain development.

It was traditionally thought that, in terms of tectonics, Western Australia had been essentially stable during much of the Cenozoic. But with the recognition of the South West Seismic Zone, the Jarradale Axis and Ravensthorpe Ramp (Diagram 2.11) and other features, this view has been modified. The most striking geomorphological expression of Cenozoic tectonic activity is in the Exmouth Gulf—Cape Range area. Here, three ranges—the Cape Range, Rough Range and Giralda Range—correspond to *anticlinal* axes initiated during post-Middle Miocene times by reverse movement on underlying normal faults. The Cape Range is the dominant of the three, reaching a height of some 300 metres. The range has been deeply dissected during uplift, which has continued to the present. This is witnessed by warped and uplifted Quaternary reef complexes which now form a staircase along the western flank of the range. On the Yilgarn Block, fault scarps a metre or so high and tens of kilometres long have formed within historic times. Such fault scarps are rapidly eroded and are only incomplete indicators of past seismic activity.

The Late Cenozoic left a significant geomorphological imprint on the landscape as a result of the climatic changes which occurred during this time. The importance of deep weathering for an understanding of the geomorphology is fundamental, but equally

striking is the geomorphological expression of the arid climates which first set in during the Late Tertiary. Repeated extensions of the arid zone occurred during the Pleistocene, and resulted in the development of desert dune sequences, which are now stabilised and are found well outside their climatic range (Diagram 2.13). Although no convincing dates are available for these events, it is generally thought that arid zone advances were coincident with global glacial maxima, and that the last massive extension of the arid zone took place at about 18,000 years before present.

Quaternary changes in climate caused variations in the hydrology and sediment supply characteristics of streams. These changes controlled alluvial deposition and resulted in formation of alluvial fills and terrace complexes along the major rivers of Western Australia. The Gascoyne, Fitzroy and, on a smaller scale the Swan River, all possess well-developed terrace forms flanking their present courses (Diagram 2.14). In the Geraldton area, extensive alluvial deposition, linked to changes in sediment yield processes, took place during the early part of the Late Quaternary. It is now known, from radiocarbon dates, that significant parts of the Swan and Helena river terrace fills were deposited since around 40,000 years before present. In the Carnarvon Basin, the large wedge of sediments associated with the avulsion of the lower Gascoyne River was deposited over the last 120,000 years.

During the Late Cenozoic global ice volume changes significantly altered sea level. Thus, during the last interglacial-glacial-interglacial cycle, from about 130,000 years ago to present, sea level along the Western Australian coast ranged from 8 metres 120,000 years ago to -50 metres at 18,000 years ago, and reached its present level (or slightly above) by 6,500 years ago. These changes in sea level have influenced geomorphological evolution along many coastal areas in Western Australia.

During the Late Tertiary or Early Pleistocene, shoreline complexes, now at heights of 90 to 115 metres (Eneabba and Ridge Hill Shelf)—and 20 to 80 metres (Yoganup Formation), were deposited in the Perth Basin. They were the initial sequences of a series of coastal barriers which formed in the Perth Basin throughout the Quaternary.

DIAGRAM 2.13

The present occurrence of Late Pleistocene (?) desert dunes in the central coastal areas of Western Australia.

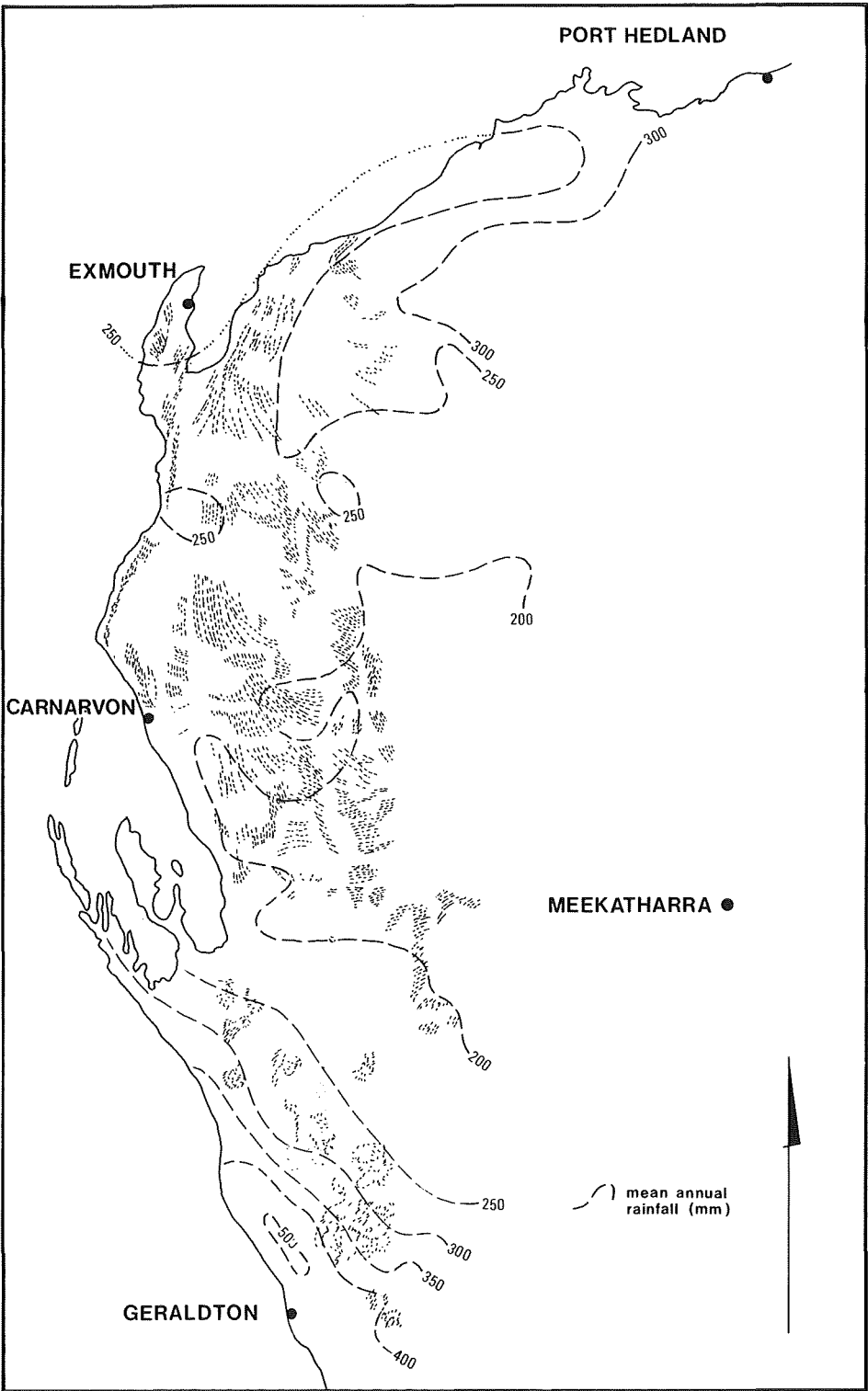
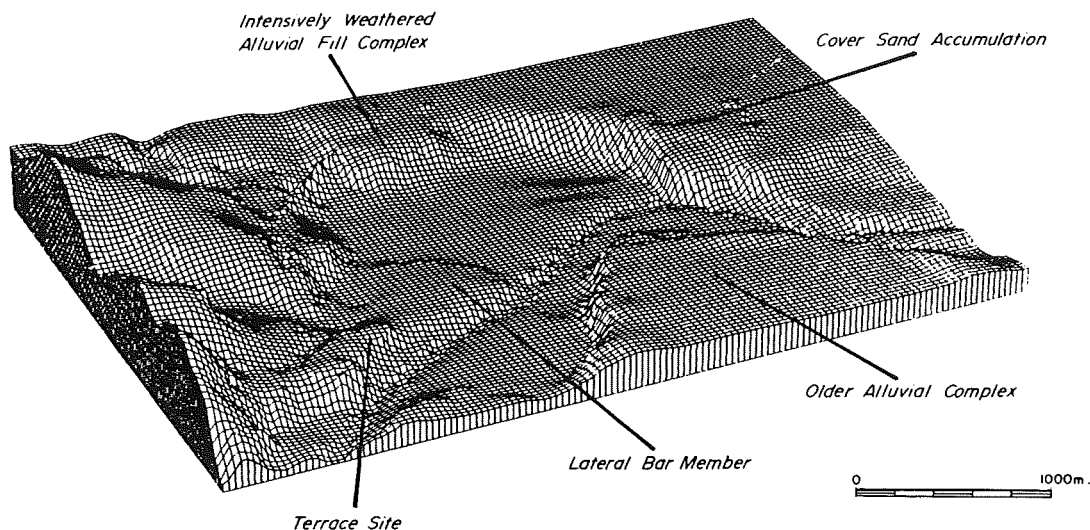


DIAGRAM 2.14

The terraces and associated deposits of the Swan River immediately downstream of the Darling Scarp (vertical exaggeration approximately x5). The digital terrain model is a view from the north-east.



In the course of the Late Cenozoic there was a significant change in the nature of coastal sediments in the Perth Basin. The older barrier sequences are essentially siliciclastic deposits, whereas the younger Pleistocene barriers are carbonate rich. The Tamala Limestone sequences which dominate much of the coastal plain of the Perth Basin, and which in the Carnarvon Basin have led to the development of the distinctive Shark Bay region, are a Middle to Late Quaternary phenomenon.

Significant geomorphological modifications have taken place over many parts of Western Australia in the last 150 years, linked to European land use practices; consequently rates of sediment yield may well be an order of magnitude higher than earlier in the Late Cenozoic. Widespread erosion is evident in many catchments and high rates of sediment supply are changing the hydraulic and sediment regimes of streams. Wind erosion is equally widespread, and in the most severely affected catchments, such as the Gascoyne, the loss of the vegetation cover

has resulted in the local mobilisation of former desert dunes, giving rise to fears of desertification.

GLOSSARY

Adamellite: Granitic rock in which 10 to 15 per cent of the felsic constituents are quartz, and in which the ratio of alkali feldspar to total feldspar is between 35 and 65 per cent.

Alluvium: Unconsolidated sedimentary material transported by a river and deposited on flood plains, estuaries and deltas.

Andesite: Very fine crystalline extrusive rock of volcanic origin composed largely of plagioclase feldspar with smaller amounts of dark-coloured mineral (hornblende, biotite or pyroxene) - the extrusive equivalent of diorite.

Anticline: An arch-shaped fold in which the younger strata remain at the top of the succession.

Aphanitic: Referring to the texture of an igneous rock in which the crystalline components are not distinguishable by the unaided eye.

Basalt: An *aphanitic* crystalline rock of volcanic origin, composed largely of plagioclase feldspar and dark minerals such as pyroxene and olivine - the extrusive equivalent of gabbro.

Batholith: A large intrusive mass of igneous rock, typically granite, outcropping over at least 100 square kilometres and extending to an unknown depth. Batholiths are particularly characteristic of orogenic belts in subduction zones.

Biotite: A black, brown or dark green ferromagnesian mica, abundant and widely distributed in igneous and metamorphic rocks.

Craton: The large, relatively immobile (stable) portion of continents, consisting of shields and platforms, which has remained unaffected by orogenic activity for commonly several periods of time.

Diamictite: A coarse sedimentary rock that is not sorted, or is poorly sorted, and contains particles of many sizes.

Dyke: A tabular intrusion of igneous rock, normally of intermediate grain size, that cuts discordantly through the surrounding rock.

Felsic: An acronym derived from feldspar and silica, and used to describe light-coloured silicate minerals such as quartz, feldspar and felspathoids.

Gneiss: A coarse grained crystalline rock formed during high-grade regional metamorphism of igneous or sedimentary rocks, characterised by a banded appearance and linear orientation of minerals.

Graben: A block of the Earth's crust, generally with a length much greater than its width, that has dropped relative to the blocks on either side.

Granite: A coarse grained acid igneous rock, consisting mainly of quartz, alkali feldspar and mica, with various accessory minerals. It occurs in intrusive bodies from crystallised magma, or the 'granitisation' (metasomatic transformation) of pre-existing rocks.

Isostasy: A condition of equilibrium in the Earth's crust. Assuming that the lighter

continental masses float on a denser medium, changes in crustal elevation must be compensated in some way at depth.

Karst: A topography formed over limestone, dolomite or gypsum and characterised by sinkholes, caves and underground drainage.

Komatiite: Lavas with a high magnesium content, thought to be unique to the Early Precambrian.

Laterite: Weathered material composed principally of the oxides of iron, aluminium, titanium, and manganese; laterite ranges from soft, earthy, porous soil to hard, dense rock.

Lignite: Coal of relatively recent origin, intermediate between peat and bituminous coal; often contains patterns from the wood from which it formed. Also known as brown coal.

Lithosphere: The outer, rigid shell of the solid Earth, overlying the less rigid athenosphere. The lithosphere comprises the crust (both oceanic and continental) and that part of the mantle (the lithospheric mantle) above the athenosphere to which the crust is mechanically coupled. The total thickness of the lithosphere varies between about 50 and 100 kilometres below the Earth's surface.

Mafic: A general term describing ferromagnesian minerals.

Mantle: The section of the Earth's interior between the crust and the outer core, bounded at the top by the Mohorovicic discontinuity and at the base by the Gutenberg discontinuity.

Metamorphic rock: A rock formed from pre-existing solid rocks by mineralogical, structural and chemical changes, through the action of heat or pressure or both.

Metasediment: A sediment or sedimentary rock which shows evidence of metamorphism.

Migmatite: A very high-grade metamorphic rock in which extremes of temperature and pressure have induced partial melting so that the rock has taken on some of the characteristics of igneous texture.

Mobile belt: A long, relatively narrow region where crustal mobility by magmatism, metamorphism and tectonic activity has led to widespread deformation.

Morphotectonics: Refers to the relationship between geomorphology and tectonics irrespective of scale.

Orogeny: An episode of tectonic activity (folding, faulting, thrusting) and mountain-building usually related to a destructive plate margin.

Plate tectonics: The interaction of the large rigid sections into which the Earth's lithosphere is divided. There are eight major plates and numerous smaller ones.

Playa: A low, essentially flat, part of a basin or other undrained area in an arid region.

Plutonic rock: Igneous rock which has formed from magma which has crystallised as an intrusion at depth in the crust and is coarsely crystalline.

Porphyry: An igneous rock in which phenocrysts (large conspicuous crystals) are enclosed in a very fine-grained to aphanitic matrix.

Regolith: The layer or blanket of unconsolidated rocky debris of any thickness that overlies bedrock and forms the surface of the land.

Regression: Retreat of the sea from land areas, and the consequent evidence of such withdrawal.

Sedimentary basin: An area of continued subsidence of the crust that accumulates sediment over a prolonged period.

Shield: A major structural unit of the Earth's crust, consisting predominantly of Precambrian metamorphic and igneous rocks

which have remained unaffected by later orogenics.

Sill: A tabular igneous intrusion that is oriented parallel to the planar structure of surrounding rock.

Spongolite: A rock or sediment composed chiefly of the remains of sponges.

Syntectonic: Refers to a geologic process or event occurring during tectonic activity.

Tectonics: A branch of geology dealing with the broad architecture of the outer part of the Earth, that is, the regional assembling of structural or deformational features, a study of their mutual relations, origin and historical evolution.

Tholeiite: A variety of basalts composed principally of plagioclase, pyroxene, and iron oxide minerals as phenocrysts in a glassy ground mass.

Transcurrent fault: A strike-slip fault characterised by a steeply inclined surface.

Transgressive deposit: Sediment deposited during transgression (landward extension) of the sea.

Tuff: Consolidated volcanic ash, composed largely of fragments produced directly by volcanic eruption; much of the volcanic material represents finely comminuted crystals and rocks.

Ultrabasic: Of igneous rock, having a low silica content, as opposed to the higher silica contents of acidic, basic, and intermediate rocks.

Volcanics: Igneous rocks that solidified after reaching, or nearing, the Earth's surface.

REFERENCES

- Bowler, J.M. (1976), Aridity in Australia : age, origins and expressions in aeolian landforms and sediments. *Earth Science Reviews* 12, 279-310.
- Bunting, J.A. (1986), Geology of the Eastern Part of the Nabberu Basin, Western Australia. *Geological Survey of Western Australia Bulletin* 131
- Butt, C.R.M. (1981), The nature and origin of laterite weathering mantle with particular reference to Western Australia, in Doyle, H.A., Glover, J.E. and Groves, D.I. (eds), *Geophysical prospecting in deeply weathered terrains*. Geology Department and University Extension, The University of Western Australia, 11-29.
- Collins, L.B. and Baxter, J.L. (1984), Heavy mineral-bearing strandline deposits, associated with high-energy beach environments, Southern Perth Basin, Western Australia. *Australian Journal of Earth Sciences*, 31, 288-292.
- Fairbridge, R.W. and Finkl, C.W. (1978), Geomorphic analysis of the rifted cratonic margins of Western Australia. *Zeitschrift für Geomorphologie* 26, 137-150

- Gee, R.D. (1979), Structure and tectonic style of the Western Australian Shield. *Tectonophysics*, 58, 327-369.
- Geological Survey of Western Australia (1975), *Geology of Western Australia. Geological Survey of Western Australia*, Memoir 2.
- Glover, J.E. and Groves, D.I. (eds) (1981), *Archaean geology: Second International Symposium*, Perth. *Geological Society of Australia Special Publication No. 7*.
- Harris, L.B., (1987), A tectonic framework for the Western Australian Shield and its significance to gold mineralisation: a personal view, in Ho, S.E. and Groves, D.I. (eds), *Recent advances in understanding Precambrian gold deposits*. Geology Department and University Extension, The University of Western Australia, 1-28.
- Hocking, R.M., Moors, H.T. and Van de Graaff, W.J.E. (1987), *Geology of the Carnarvon Basin Western Australia. Geological Survey of Western Australia*, Bulletin 133.
- Jackson, M.J. and Van de Graaff, W.J.E. (1981), *Geology of the Officer Basin, Western Australia Bureau of Mineral Resources*, Bulletin 206.
- Jaques, A.L., Lewis, J.D. and Smith, C.B. (1986), The kimberlites and lamproites of Western Australia. *Geological Survey of Western Australia*. Bulletin 132.
- Johnson, M.H., Lowry, D.C., and Quilty, P.G. (1973), The geology of south-western Australia. *Journal of Royal Society, Western Australia*, 56, 5-15.
- Logan, B.W., Davis, G.P., Read, J.E. and Cebulski, D.E. (1970), Carbonate sedimentation and environments, Shark Bay, Western Australia. *American Association Petroleum Geologists*, Memoir 13.
- Lowry, D.C. (1970), The geology of the Western Australian part of the Eucla Basin. *Geological Survey Western Australia*, Bulletin 122.
- NcNaughton, N.J. and Dahl, N. (1987), A geochronological framework for gold mineralisation in the Yilgarn Block, Western Australia, in Ho, S.E. and Groves, D.I. (eds), *Recent advances in the understanding of Precambrian gold deposits*. Geology Department and University Extension, 29-50.
- Department of Mines (1987), *An overview of mining in Western Australia*, 44p.
- Muhling, P.C. and Brakel, A.T. (1985), *Geology of the Bangemall Group. Geological Survey of Western Australia*, Bulletin 128.
- Mulcahy, M.J. (1973), Landforms and soils in South-western Australia. *Journal Royal Society of Western Australia*, 6, 16-22.
- Playford, P.E., Cockbain, A.E. and Low, G.H. (1976), *Geology of the Perth Basin, Western Australia. Geological Survey of Western Australia*, Bulletin 124.
- Plumb, K.A. (1979), The tectonic evolution of Australia. *Earth-Science Reviews*, 14, 205-249.
- Purcell, P.G. (ed) (1984), *The Canning Basin, Western Australia. Proceedings of Geological Society of Australia/Pel. Expl. Soc. Aust. Symposium Perth*.
- Quilty, P.G. (1984), Mesozoic and Cenozoic history of Australia as it affects the Australian biota, in Logger, E.M. and Cameron, E.E. (eds), *Arid Australia*. National Museum, Sydney, 7-56.
- Trendall, A.F. (1983), The Hamersley Basin, in Trendall, A.F. and Morris, R.C. (eds), *Iron-formation, facts and problems*. Elsevier, 69-123.
- Twidale, R.R., Horwitz, R.C. and Campbell, E.M. (1985), Hamersley landscapes of the north-west of Western Australia. *Review de Geologie Dynamique et de Geographie Physique*, 26, 173-186.
- Van de Graaff, W.J.E. (1981), Paleogeographic evolution of a rifted cratonic margin: south-west Australia - discussion. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 34, 163-172.
- Van de Graaff, W.J.E., Crowe, R.W.A., Bunting, J.A. and Jackson, M.J. (1977), Relict Early Cenozoic drainages in Western Australia, *Zeitschrift fur Geomorphologie*, 21, 379-400.
- Veevers, J.J., (ed) (1984), *Phanerozoic history of Australia*, Oxford, Clarendon Press.

Chapter 3

CLIMATE AND METEOROLOGY

(Contributed by the Western Australian Regional Office of the Bureau of Meteorology)

Western Australia is the largest State in the Commonwealth, extending from latitude 13°30' S to 35°08' S, and from longitude 113°09' E to 129° E. It stretches about 2,400 kilometres in a north-south direction and about 1,600 kilometres west-east. A little more than one-third of the State lies within the tropics, while the remainder extends southward to the temperate zone.

Because of its large size and its latitudinal position, Western Australia has entirely different climates in its northern and southern parts, while in the central regions there is a gradual change from the tropical climate of the north to the typical Mediterranean climate of the south.

Most of the State is a plateau between 300 and 600 metres above mean sea-level and there are no outstanding mountain ranges. Where the edge of the plateau forms the Darling Range along the southern part of the west coast, it exerts a marked influence on the rainfall, causing a rapid increase from the coastal plain to the higher land. Elsewhere the effect of topography is less marked and its main influence is seen in the general decrease of rainfall with increasing distance from the coast.

PRESSURE SYSTEMS

Weather during the year is controlled largely by the movement of the anticyclonic belt (high pressure systems with anti-clockwise winds) which lies in an east-west direction across the continent for about six months of the year.

In winter this system moves northward, bringing clear skies with fine sunny days and easterly winds to the tropics. With this northward movement, westerly winds on the southern side of the anticyclones extend over the southern part of the State, bringing with them cool cloudy weather and rain. In mid-winter the northern fringe of the 'Roaring forties' extends to Western Australia and there are frequent westerly gales in the south coastal belt.

These westerly winds are maintained by a series of depressions (low pressure systems

with clockwise winds), which move eastward well south of the Western Australian coast, and others which originate in the Indian Ocean and move south-eastward past Cape Leeuwin. The extent to which westerlies affect the State depends largely on the intensity and the position of these depressions.

Towards the end of winter the anticyclonic belt moves southward, and the westerlies are confined more to the lower south-west and the south coastal districts. By summer the anticyclonic belt has moved so far south that its axis is off the south coast and easterly winds prevail over most of the State.

During this summer period the midday sun is at a high elevation in the tropics and the continual heating leads to the development of a monsoonal depression over this region. Wind circulation round this system causes easterlies on its southern or inland side, but in the coastal districts north-east from Onslow, and in parts of the Kimberley, westerlies prevail. Winds in both the north and the south of the State are then in the opposite direction to those prevailing during the winter.

Nearing summer's end the anticyclonic belt moves northward again. The monsoonal depression over the tropics dissipates and westerlies again gradually extend northward to the southern part of the State.

During the northern 'Wet' season (from about December to March), occasional cyclones, known locally as 'willy willys', bring strong winds and rain to the tropics. They originate generally in the Timor Sea or off the north-west coast and often move first in a south-westerly direction parallel to the coast and later in a south-easterly direction.

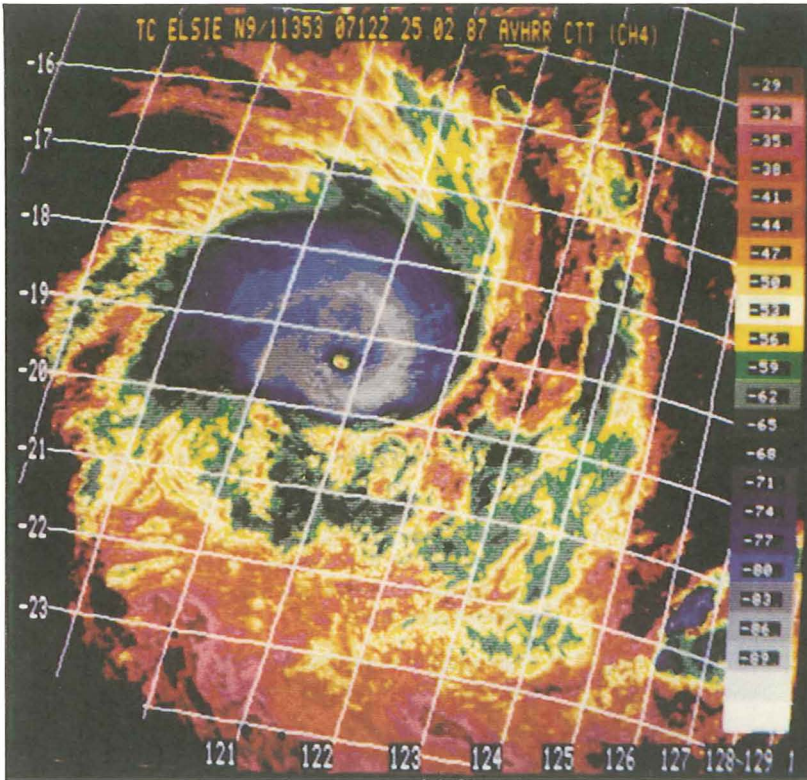


DIAGRAM 3.1

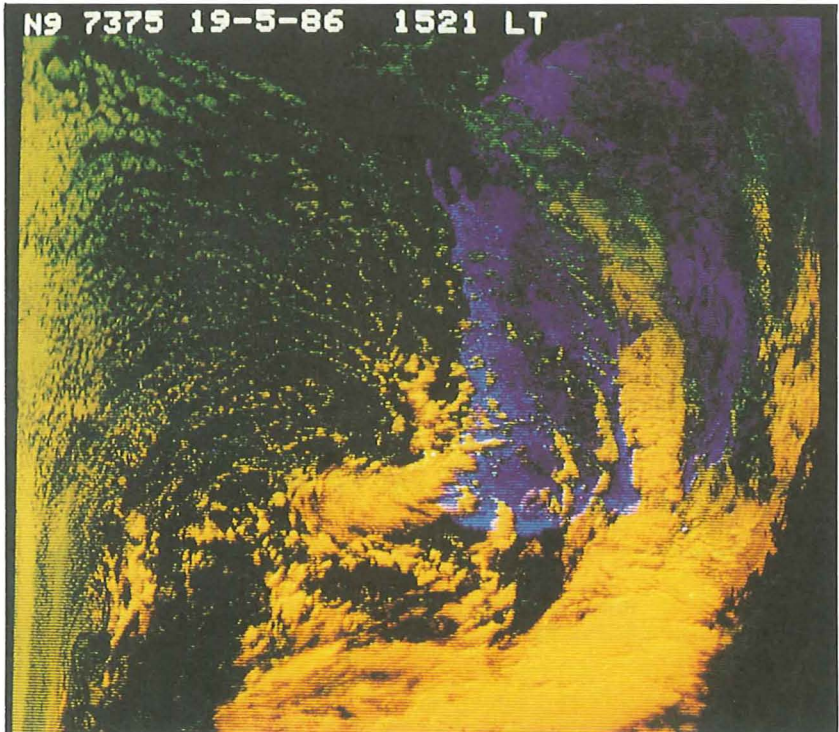
Infrared computer enhancement showing cloud top temperatures of tropical cyclone Elsie. The cyclone crossed the coast near Mandora station in the Pilbara on 25 February 1987. The data were recorded by the Advanced Very High Resolution Radiometer (AVHRR) on board the National Oceanic and Atmospheric Administration (NOAA) 9 Polar Orbiting Satellite.

Photograph: Ron Hille

DIAGRAM 3.2

Visual image showing false colour enhancement of two cold fronts moving through the southern portion of Western Australia. The data were recorded by the Advanced Very High Resolution Radiometer (AVHRR) on board the National Oceanic and Atmospheric Administration (NOAA) 9 Polar Orbiting Satellite.

Photograph: Ron Hille.



They frequently move inland between Broome and Onslow but occasionally travel further westward before curving to the south-east and moving inland over the west coast. Others fade out at sea without ever crossing the coast. Those that move inland usually start to dissipate soon after crossing the coast, but occasionally they move right across the State, passing into the Southern Ocean and moving off towards Tasmania.

These storms are often extremely violent and have on occasions almost completely wrecked towns on the north-west coast, while a cyclone which struck a pearling fleet off the Eighty Mile Beach in 1887 caused the loss of twenty-two vessels and 140 lives.

However, despite the damage which they cause, the storms are of great benefit to the pastoral regions on account of the heavy and widespread rain which generally accompanies them. The heaviest fall ever recorded in one day in Western Australia, 747 millimetres, was received at Whim Creek from a cyclone in 1898.

RAINFALL

The moist rain-bearing winds in this State are in general from a westerly direction. The

easterlies, having come from the dry inland parts of Australia, usually bring fine weather and clear skies.

Because of this the highest rainfall occurs in the winter months in the south of the State, and in the summer months in the north. In between these areas there is a gradual change from one rainfall regime to the other.

Proceeding northward from the winter rainfall area of the south-west of the State, the wet period occurs earlier during the year. Across a belt Carnarvon-Menzies-Eucla, there is a more rapid change, and this belt divides the winter rainfall area from that which receives most of its rain in the first six months of the year. Further north, the change is more gradual but continuous and in the Kimberley most of the year's rainfall is received in the summer months which, in the southern parts of the State, are the driest of the year.

The mean annual rainfall for Western Australia is shown on Diagram 3.3.

Table 3.1 shows the average rainfall and number of wet days, the highest and lowest monthly totals, and the highest daily fall for various centres.

TABLE 3.1 - RAINFALL AT REPRESENTATIVE CLIMATOLOGICAL STATIONS
(Stations are arranged from north to south in three groups: Coastal, Wheat Belt and Other Inland)

Reporting station and characteristic		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
COASTAL														
Wyndham (New site) (a)—														
Rainfall (mm)—	Average	161	210	180	27	13	1	7	—	10	20	54	92	775
	Highest	305	369	428	119	98	8	84	—	78	75	174	226	1,101
	Lowest	47	110	15	—	—	—	—	—	—	—	2	15	462
Wet days—	Highest one day	89	77	140	74	48	8	49	—	78	38	84	83	140
	Average number	15	15	12	3	1	—	—	—	1	3	6	9	65
Broome—														
Rainfall (mm)—	Average	181	166	95	27	33	19	5	2	2	2	9	42	583
	Highest	825	427	439	226	176	208	72	23	24	28	50	279	1,228
	Lowest	5	8	1	—	—	—	—	—	—	—	—	—	139
Wet days—	Highest one day	351	151	204	107	119	127	55	12	13	15	37	210	351
	Average number	12	11	8	3	3	2	1	1	1	1	1	5	49
Port Hedland M.O. (b)—														
Rainfall (mm)—	Average	60	99	43	25	31	18	10	4	1	1	4	19	315
	Highest	454	360	251	352	170	125	81	35	9	8	67	219	627
	Lowest	—	—	—	—	—	—	—	—	—	—	—	—	47
Wet days—	Highest one day	387	329	152	111	156	53	46	25	3	7	59	169	387
	Average number	5	7	4	2	3	3	2	1	1	1	1	1	31
Onslow—														
Rainfall (mm)—	Average	27	45	51	20	44	43	19	10	1	1	2	4	267
	Highest	261	539	415	279	259	194	222	107	25	27	56	61	999
	Lowest	—	—	—	—	—	—	—	—	—	—	—	—	15
Wet days—	Highest one day	158	356	283	157	117	111	76	62	17	21	30	38	356
	Average number	2	3	3	2	3	4	2	2	—	—	—	1	22

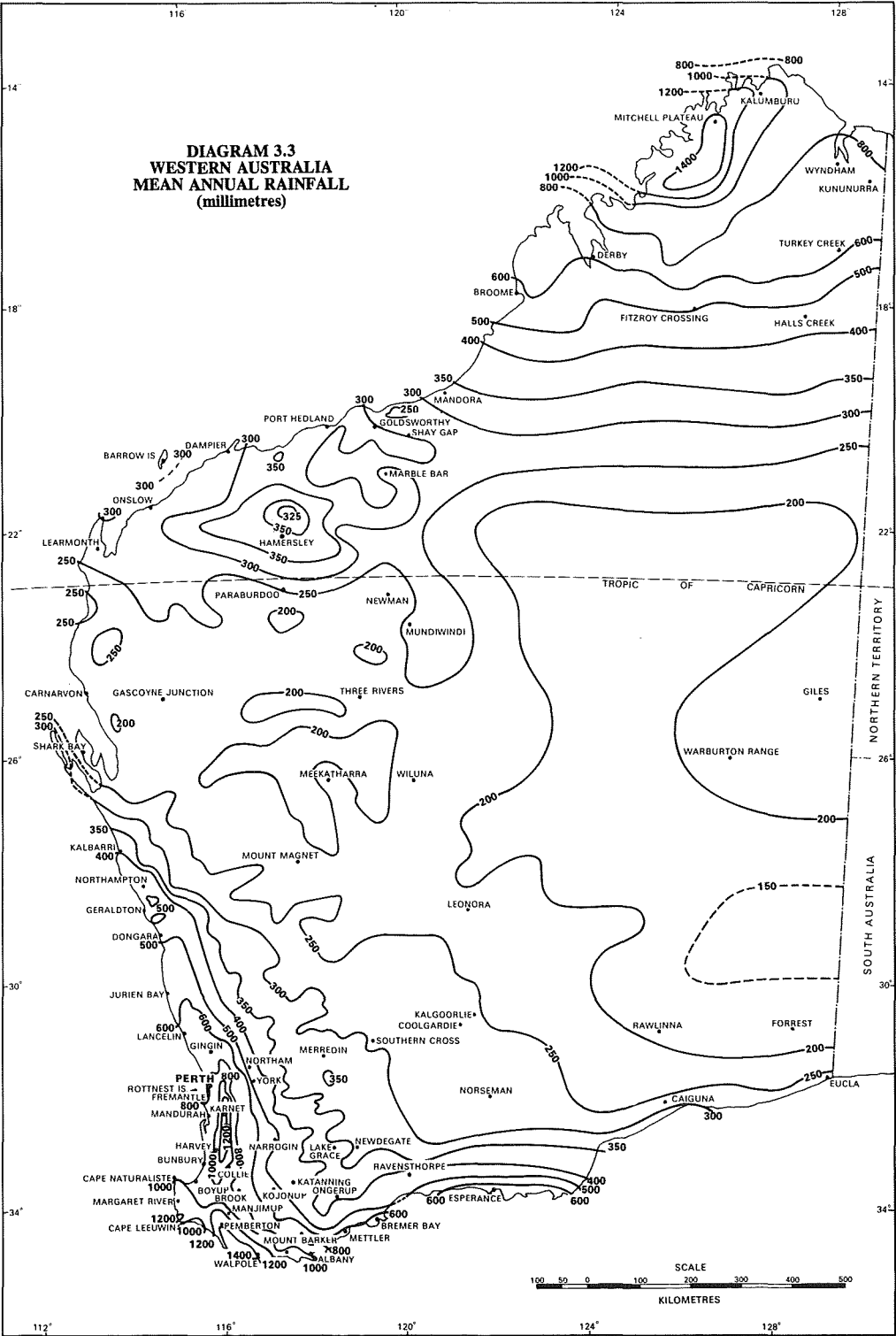


TABLE 3.1 - RAINFALL AT REPRESENTATIVE CLIMATOLOGICAL STATIONS (*continued*)
(Stations are arranged from north to south in three groups: Coastal, Wheat Belt and Other Inland)

Reporting station and characteristic		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
COASTAL (<i>continued</i>)														
Carnarvon M.O. (b)—														
Rainfall (mm)—	Average	14	21	15	11	41	49	45	18	5	6	5	1	231
	Highest	157	149	93	89	195	161	180	51	19	38	81	4	556
	Lowest	—	—	—	—	—	1	—	1	—	—	—	—	75
	Highest one day	66	78	77	76	95	96	82	35	17	25	81	4	96
Wet days—	Average number	2	3	2	3	5	7	7	5	3	3	1	1	42
Geraldton—														
Rainfall (mm)—	Average	6	12	13	26	72	116	95	66	30	20	9	5	470
	Highest	53	131	89	100	282	286	243	131	81	109	47	59	843
	Lowest	—	—	—	1	—	25	24	11	—	—	—	—	220
	Highest one day	36	69	88	48	62	109	72	59	39	71	24	51	109
Wet days—	Average number	2	2	3	6	10	14	15	13	9	7	4	2	87
Perth (Bureau of Meteorology)—														
Rainfall (mm)—	Average	9	12	19	45	123	182	173	137	81	54	21	14	870
	Highest	115	166	145	149	308	476	425	318	199	200	73	81	1,339
	Lowest	—	—	—	—	14	55	62	12	9	1	—	—	509
	Highest one day	55	87	77	67	76	99	76	74	52	55	39	47	99
Wet days—	Average number	3	3	4	8	14	17	18	17	14	11	6	4	119
Bunbury—														
Rainfall (mm)—	Average	11	12	22	46	128	183	171	124	80	54	26	14	871
	Highest	157	103	91	175	288	412	417	302	201	195	84	80	1,365
	Lowest	—	—	—	—	10	36	49	21	—	5	—	—	484
	Highest one day	115	86	66	61	79	82	95	62	58	39	38	27	115
Wet days—	Average number	2	2	4	7	14	18	20	17	14	11	6	4	119
Albany M.O. (b)—														
Rainfall (mm)—	Average	22	24	27	69	96	105	124	105	81	83	46	26	808
	Highest	123	62	85	127	192	224	204	174	133	172	117	97	966
	Lowest	3	4	7	21	47	45	55	52	43	37	6	5	628
	Highest one day	80	36	52	52	40	38	43	44	44	53	29	42	53
Wet days—	Average number	8	9	11	14	18	19	21	21	18	15	12	10	176
Esperance—														
Rainfall (mm)—	Average	15	31	23	51	75	85	93	83	57	52	40	18	623
	Highest	35	80	81	155	186	129	193	145	119	117	87	81	1,003
	Lowest	2	2	1	6	18	41	23	40	16	16	21	—	438
	Highest one day	25	70	31	34	51	34	45	31	28	77	42	24	77
Wet days—	Average number	6	6	7	11	14	17	17	17	14	12	11	6	138
Eucla—														
Rainfall (mm)—	Average	14	16	20	27	33	26	24	25	20	18	17	13	253
	Highest	95	182	127	205	104	155	72	82	85	74	114	116	453
	Lowest	—	—	—	—	—	2	—	2	—	1	—	—	52
	Highest one day	54	115	51	41	75	36	26	38	40	33	74	49	115
Wet days—	Average number	3	4	5	7	10	10	9	9	8	6	5	4	80
WHEAT BELT														
Carnarmah—														
Rainfall (mm)—	Average	11	15	21	23	51	83	70	54	29	18	11	9	395
	Highest	103	103	180	121	170	231	188	192	83	73	91	56	782
	Lowest	—	—	—	—	2	13	11	12	1	—	—	—	204
	Highest one day	97	78	153	89	74	61	43	79	33	40	71	50	153
Wet days—	Average number	2	2	2	5	9	13	14	11	8	5	3	2	76
Wongan Hills—														
Rainfall (mm)—	Average	11	16	20	23	52	77	70	52	28	20	11	9	389
	Highest	78	111	166	81	188	220	174	131	97	66	60	59	675
	Lowest	—	—	—	—	1	17	8	8	2	—	—	—	161
	Highest one day	69	80	81	62	64	70	41	34	37	36	39	57	81
Wet days—	Average number	2	2	3	5	8	12	13	12	8	6	3	2	76
Kellerberrin—														
Rainfall (mm)—	Average	11	15	21	22	42	58	53	42	26	19	12	13	334
	Highest	87	127	152	110	119	163	123	100	76	77	86	67	661
	Lowest	—	—	—	—	—	15	11	3	2	1	—	—	172
	Highest one day	52	108	103	58	41	53	38	40	24	37	45	57	108
Wet days—	Average number	2	2	3	5	8	12	13	11	8	6	3	2	75

TABLE 3.1 - RAINFALL AT REPRESENTATIVE CLIMATOLOGICAL STATIONS (*continued*)
(Stations are arranged from north to south in three groups: Coastal, Wheat Belt and Other Inland)

Reporting station and characteristic		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
WHEAT BELT (<i>continued</i>)														
Southern Cross—														
Rainfall (mm)—	Average	14	20	21	22	33	41	38	30	19	16	15	12	281
	Highest	113	137	169	128	119	183	107	88	106	79	75	72	577
	Lowest	—	—	—	—	—	5	6	1	—	—	—	—	118
	Highest one day	63	84	61	44	55	43	36	40	25	55	51	40	84
Wet days—	Average number	3	3	3	5	7	10	11	9	6	5	3	2	67
Northam—														
Rainfall (mm)—	Average	9	12	19	24	57	85	85	63	37	25	11	9	436
	Highest	80	190	189	88	148	233	221	170	129	100	70	66	711
	Lowest	—	—	—	—	1	10	20	3	3	—	—	—	194
	Highest one day	45	116	126	75	65	67	54	33	31	58	32	50	126
Wet days—	Average number	2	2	3	5	10	15	16	14	11	7	4	2	91
Wandering—														
Rainfall (mm)—	Average	11	15	21	35	80	120	116	94	62	44	18	15	631
	Highest	156	244	122	121	195	368	324	270	192	130	65	106	1,051
	Lowest	—	—	—	—	11	25	34	14	8	1	—	—	297
	Highest one day	115	138	104	51	61	85	69	53	40	43	48	64	138
Wet days—	Average number	3	3	4	7	13	17	18	16	14	11	6	4	116
Narrogin—														
Rainfall (mm)—	Average	11	17	21	30	66	93	89	69	47	35	17	13	508
	Highest	135	237	128	121	167	300	243	185	121	128	77	95	741
	Lowest	—	—	—	—	10	25	16	7	2	—	—	—	269
	Highest one day	91	115	114	63	68	71	81	42	36	49	38	58	115
Wet days—	Average number	2	3	3	6	11	14	15	14	11	9	5	3	96
Katanning—														
Rainfall (mm)—	Average	13	17	23	31	61	80	77	63	46	38	21	16	486
	Highest	217	225	134	162	148	214	174	173	123	115	98	74	782
	Lowest	—	—	—	1	7	21	22	13	4	5	—	—	273
	Highest one day	116	126	70	106	59	70	38	44	37	50	55	55	126
Wet days—	Average number	3	4	5	7	13	17	18	16	13	10	6	4	116
OTHER INLAND														
Halls Creek M.O. (b)—														
Rainfall (mm)—	Average	147	127	70	24	15	4	6	3	4	17	32	69	518
	Highest	501	484	381	162	105	87	71	49	85	92	175	208	791
	Lowest	14	3	2	—	—	—	—	—	—	—	1	4	250
	Highest one day	202	124	100	88	62	36	48	42	37	61	97	120	202
Wet days—	Average number	13	12	8	3	2	1	1	1	1	3	6	11	62
Marble Bar—														
Rainfall (mm)—	Average	76	79	53	21	24	23	12	6	1	4	10	36	345
	Highest	310	337	389	241	187	165	134	46	24	116	62	243	742
	Lowest	—	—	—	—	—	—	—	—	—	—	—	—	72
	Highest one day	152	121	305	125	91	105	63	32	24	84	61	150	305
Wet days—	Average number	7	7	5	2	2	2	1	1	—	1	2	4	34
Meekatharra M.O. (b)—														
Rainfall (mm)—	Average	26	29	22	14	24	32	22	11	4	6	14	9	213
	Highest	129	142	166	65	96	156	166	56	31	62	113	25	420
	Lowest	—	—	—	—	—	1	—	—	—	—	—	—	66
	Highest one day	103	57	58	37	37	61	62	23	17	25	82	24	103
Wet days—	Average number	4	4	4	4	5	6	6	4	2	2	2	3	46
Laverton—														
Rainfall (mm)—	Average	22	24	31	23	24	24	15	13	8	7	15	15	221
	Highest	142	144	122	205	124	126	66	85	67	50	152	152	452
	Lowest	—	—	—	—	—	—	—	—	—	—	—	—	66
	Highest one day	75	87	67	54	52	40	33	41	44	49	91	71	91
Wet days—	Average number	3	3	4	3	5	5	4	4	2	2	3	3	41
Kalgoorlie M.O. (b)—														
Rainfall (mm)—	Average	21	29	19	20	26	32	26	20	14	15	18	13	253
	Highest	186	308	143	99	110	186	83	65	98	84	115	41	488
	Lowest	—	—	—	—	—	2	2	3	1	—	—	—	108
	Highest one day	154	178	70	50	45	57	28	40	44	77	77	27	178
Wet days—	Average number	3	4	4	5	7	9	9	7	5	4	4	3	64

TABLE 3.1 - RAINFALL AT REPRESENTATIVE CLIMATOLOGICAL STATIONS (continued)
(Stations are arranged from north to south in three groups: Coastal, Wheat Belt and Other Inland)

Reporting station and characteristic		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
OTHER INLAND (continued)														
Rawlinna—														
Rainfall (mm)—	Average	13	17	20	17	18	19	14	16	13	13	13	15	188
	Highest	210	123	85	114	81	131	59	155	85	64	81	117	497
	Lowest	—	—	—	—	—	—	—	—	—	—	—	—	79
	Highest one day	100	73	48	58	31	38	25	66	72	31	65	49	100
Wet days—	Average number	2	3	3	3	5	5	5	5	4	3	3	3	44
Collie—														
Rainfall (mm)—	Average	17	15	24	50	130	189	186	144	101	70	31	16	973
	Highest	243	178	105	183	270	474	440	414	249	213	106	81	1,467
	Lowest	—	—	—	4	15	56	52	31	15	2	1	—	605
	Highest one day	74	106	84	63	62	91	69	73	58	49	36	32	106
Wet days—	Average number	3	3	5	9	17	20	22	20	17	14	8	5	143
Manjimup—														
Rainfall (mm)—	Average	20	20	31	64	137	180	183	148	109	81	47	24	1,044
	Highest	92	117	138	194	269	332	320	323	257	165	122	78	1,761
	Lowest	—	—	1	8	26	86	43	49	24	9	3	—	650
	Highest one day	79	44	89	77	79	83	50	54	59	53	49	32	89
Wet days—	Average number	5	6	7	11	17	20	22	20	17	14	10	7	156
Pemberton—														
Rainfall (mm)—	Average	21	20	39	83	156	206	224	163	120	93	60	35	1,220
	Highest	80	86	128	213	337	365	391	388	214	189	160	92	1,712
	Lowest	1	1	5	6	36	116	130	50	45	13	6	3	802
	Highest one day	60	30	77	81	77	59	91	61	45	44	45	42	91
Wet days—	Average number	7	5	8	12	18	20	22	21	18	15	12	9	167
Mount Barker—														
Rainfall (mm)—	Average	23	25	36	56	86	99	108	92	81	73	42	30	751
	Highest	182	179	129	234	243	209	261	173	157	160	155	87	1,095
	Lowest	1	1	4	4	16	43	22	33	18	16	3	1	431
	Highest one day	105	72	56	139	69	68	72	48	45	54	64	44	139
Wet days—	Average number	7	7	10	13	17	19	21	20	18	16	11	9	168

(a) Commencing with Year Book No. 21—1983 figures relate to reporting station on a new site. (b) M.O. denotes Meteorological Office.

TABLE 3.2 - ANNUAL RAINFALL AT REPRESENTATIVE STATIONS
(millimetres)

Station	1981	1982	1983	1984	1985	1986	Long term average (a)
Albany (M.O.)	812	720	612	773	820	740	808
Broome (M.O.)	907	1,146	497	503	395	339	583
Bunbury	796	810	710	817	(b)	p665	871
Carnamah	405	360	418	442	231	388	395
Carnarvon (M.O.)	181	145	208	352	202	210	231
Collie	948	870	1,040	812	753	638	973
Esperance (M.O.)	555	515	468	643	561	651	623
Eucla	375	270	390	287	240	312	261
Geraldton (M.O.)	480	497	419	512	392	558	470
Giles (M.O.)	239	399	426	208	84	200	263
Halls Creek (M.O.)	619	991	731	679	283	457	518
Kalgoorlie (M.O.)	307	305	240	293	210	280	253
Katanning	399	513	569	467	409	397	486
Kellerberrin	346	284	386	374	261	337	334
Leonora	206	292	225	329	223	233	222
Manjimup	1,153	819	966	1,029	913	791	1,044
Marble Bar	390	558	338	412	238	266	345
Meekatharra (M.O.)	161	353	218	329	170	303	213
Mount Barker	637	696	611	697	601	612	751
Narrogin	513	549	662	462	435	387	508
Newman	281	406	240	316	270	177	321
Northam	503	400	615	357	322	445	436
Onslow	255	226	126	(b)	67	432	267
Pemberton	1,251	976	1,039	1,284	1,040	997	1,220
Perth (Bureau of Meteorology)	848	817	820	827	691	930	870
Port Hedland (M.O.)	376	381	289	253	102	167	315
Southern Cross	337	324	287	304	346	331	281
Wandering	544	497	697	511	489	507	631

TABLE 3.2 - ANNUAL RAINFALL AT REPRESENTATIVE STATIONS (*continued*)
(millimetres)

Station	1981	1982	1983	1984	1985	1986	Long term average (a)
Wongan Hill	439	366	471	412	356	401	389
Wyndham	854	743	661	723	462	683	775

(a) Number of years of record used to calculate the long-term average varies from station to station. (b) Records incomplete. Note (M.O.) denotes Meteorological Office.

TEMPERATURE

The hottest months in Western Australia are November in the Kimberley, December a little further south and January near the Tropic of Capricorn. In the tropics temperatures generally rise from July, the coldest month, to November. In some places further rises occur, but in others the onset of the 'Wet' prevents this further rise and there is a slight fall. As the rains cease at these latter places temperatures start to rise again and there is another minor peak in March or April. After this there is a general fall until July.

South of the tropics the hottest month is January, except in coastal districts where February is hotter. The coldest month is again July.

The most consistently hot place in the State is Wyndham, where the mean maximum throughout the year is 35.5°C and the mean minimum for the coldest month is 16.9°C. Although at Marble Bar the yearly mean maximum of 35.3°C is very similar to that of Wyndham, its mean minimum temperatures are consistently lower, falling to 11.6°C in the coldest month. The mean maximum at Marble Bar is the highest in Australia, exceeding 37.8°C in the five months from November to March inclusive. There are often long spells of hot weather in this region and during one period, from 31 October 1923 to 7 April 1924, the maximum temperature at Marble Bar reached or exceeded 37.8°C on 160 consecutive days.

Further south temperatures are lower, but even in the southern parts of the State there are occasional heat waves, the highest temperature on record being 50.7°C recorded at Eucla on the south coast.

Near the coast the sea breeze generally brings relief from high temperatures. It blows nearly every afternoon in the hot months, and is known in Perth as the 'Fremantle Doctor'. Away from the influence of the sea, extremes are greater, day temperatures being higher and night temperatures lower than in the coastal districts. During the winter, temperatures have fallen below -1.1°C in most of the inland part of the State south from the tropics. The lowest on record is -6.7°C which occurred at Booylgoo near Sandstone on 15 July 1943, and as far north as Mundiwindi, almost in the tropics, -5.3°C has been recorded.

Frosts are at times widespread over the southern part of the State and occasionally extend into the tropics, but in general they are not particularly troublesome as they normally occur during that period of the year when crops are least susceptible to frost damage. They occur mainly in the months May to September inclusive and are most frequent in July and August.

Table 3.3 shows, for each month of the year, the mean maximum, mean minimum, and extreme temperatures and the average number of days with registrations of 30.0°C and over and of 40.0°C and over. The average number of days with temperatures of 2.0°C or below, which provides an indication of frost frequency, is also shown.

Reporting station and characteristic	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
COASTAL													
Wyndham													
Mean max., °C	37.0	35.9	35.7	35.8	33.3	31.0	30.9	33.8	36.2	38.5	39.1	38.6	35.5
Mean min., °C	26.2	25.8	25.2	23.5	20.6	17.7	16.9	19.5	22.8	25.5	26.8	26.8	23.1
Highest max., °C	44.2	42.8	41.6	39.8	38.8	36.0	36.2	39.1	40.6	43.1	45.4	45.0	45.4
Lowest min., °C	21.0	23.5	23.5	20.6	19.1	16.8	15.0	18.3	21.1	24.0	24.4	24.5	15.0
No. of days 30.0°C and over	31	27	30	29	27	21	20	29	30	30	30	31	305
No. of days 40.0°C and over	5	2	1	—	—	—	—	—	1	7	12	10	38
No. of days 2.0°C and under	—	—	—	—	—	—	—	—	—	—	—	—	—
Broome—													
Mean max., °C	33.3	32.9	33.9	34.4	31.3	29.2	28.5	30.0	31.8	32.9	33.6	33.9	32.1
Mean min., °C	26.2	26.0	25.5	22.8	18.5	15.5	13.6	14.8	18.3	22.1	25.0	26.6	21.2
Highest max., °C	44.2	42.7	42.2	41.7	38.3	36.2	35.0	38.1	39.9	42.8	44.3	44.8	44.8
Lowest min., °C	17.8	15.0	12.8	10.7	7.3	5.2	3.3	4.8	8.9	11.6	14.7	17.4	3.3
No. of days 30.0°C and over	30	27	30	30	22	11	10	16	21	24	28	31	279
No. of days 40.0°C and over	—	—	—	—	—	—	—	—	—	1	1	1	4
No. of days 2.0°C and under	—	—	—	—	—	—	—	—	—	—	—	—	—
Port Hedland—													
Mean max., °C	36.2	35.9	36.9	35.2	29.9	27.2	26.4	28.8	32.3	34.2	36.2	36.5	33.0
Mean min., °C	25.1	25.1	24.1	20.9	17.0	13.8	11.7	12.4	15.1	17.1	20.9	23.6	18.9
Highest max., °C	47.5	47.1	44.5	45.0	38.3	34.4	34.3	36.8	40.9	43.7	47.4	47.9	47.9
Lowest min., °C	15.6	11.7	15.8	10.7	7.0	4.7	3.2	3.7	7.2	11.1	12.4	16.6	3.2
No. of days 30.0°C and over	30	28	30	28	17	5	3	10	22	26	28	31	259
No. of days 40.0°C and over	5	4	5	1	—	—	—	—	—	2	5	6	27
No. of days 2.0°C and under	—	—	—	—	—	—	—	—	—	—	—	—	—
Roebourne—													
Mean max., °C	38.3	37.7	37.2	34.8	30.0	26.6	26.2	28.5	32.2	34.9	37.8	38.8	33.6
Mean min., °C	26.1	26.0	25.1	21.8	18.1	14.9	13.2	14.2	16.5	19.2	22.6	24.6	20.2
Highest max., °C	47.8	47.6	45.7	43.4	37.8	34.3	33.3	37.9	41.6	45.0	47.4	47.6	47.8
Lowest min., °C	18.6	12.8	17.2	14.1	8.2	4.4	4.4	1.8	7.8	11.1	9.4	11.7	1.8
No. of days 30.0°C and over	30	27	30	30	19	5	3	10	24	28	30	31	268
No. of days 40.0°C and over	12	9	8	1	—	—	—	—	—	4	10	13	57
No. of days 2.0°C and under	—	—	—	—	—	—	—	—	—	—	—	—	—
Onslow—													
Mean max., °C	35.9	35.8	35.4	33.3	28.7	25.3	24.7	26.4	29.2	31.7	34.1	35.4	31.3
Mean min., °C	23.3	23.8	22.8	19.7	15.6	12.6	11.0	11.8	13.7	16.1	18.9	21.2	17.6
Highest max., °C	47.7	48.3	46.4	43.8	38.3	32.2	32.3	35.3	38.3	44.7	46.1	47.5	48.3
Lowest min., °C	15.8	15.1	14.7	10.0	5.6	2.9	3.1	4.4	5.5	7.4	10.0	9.4	2.9
No. of days 30.0°C and over	30	27	28	27	11	1	—	3	13	23	26	29	218
No. of days 40.0°C and over	6	5	4	—	—	—	—	—	—	1	3	6	25
No. of days 2.0°C and under	—	—	—	—	—	—	—	—	—	—	—	—	—
Carnarvon—													
Mean max., °C	30.8	32.0	30.1	28.1	25.9	23.1	21.9	22.4	23.8	25.6	27.0	28.9	26.7
Mean min., °C	22.6	23.1	21.9	18.7	14.9	13.0	11.0	11.3	13.8	16.4	18.7	20.8	17.2
Highest max., °C	47.7	46.9	45.3	41.1	38.0	32.3	30.7	32.3	38.4	42.4	43.4	45.4	47.7
Lowest min., °C	16.8	17.2	13.4	9.5	6.1	3.6	2.4	3.5	7.3	8.8	10.7	12.6	2.4
No. of days 30.0°C and over	15	17	15	8	3	—	—	—	2	4	4	8	77
No. of days 40.0°C and over	2	2	1	—	—	—	—	—	—	—	—	1	6
No. of days 2.0°C and under	—	—	—	—	—	—	—	—	—	—	—	—	—
Geraldton—													
Mean max., °C	31.6	32.2	30.6	26.7	24.0	20.6	19.4	19.8	21.6	24.5	27.1	29.9	25.7
Mean min., °C	18.7	19.1	17.5	14.9	12.6	11.2	9.2	8.7	8.8	10.9	13.7	16.7	13.5
Highest max., °C	47.7	47.3	44.3	39.4	36.6	28.8	28.8	31.6	36.8	40.7	42.2	46.7	47.7
Lowest min., °C	8.9	10.0	8.3	5.4	2.1	0.5	0.8	1.3	1.8	2.4	3.8	7.7	0.5
No. of days 30.0°C and over	15	17	15	7	1	—	—	—	1	3	7	11	76
No. of days 40.0°C and over	3	2	1	—	—	—	—	—	—	—	—	1	8
No. of days 2.0°C and under	—	—	—	—	—	—	—	—	—	—	—	—	—
Perth—													
Mean max., °C	29.6	29.9	27.8	24.5	20.7	18.2	17.3	17.9	19.4	21.2	24.6	27.3	23.2
Mean min., °C	17.7	17.9	16.6	14.1	11.6	9.9	9.0	9.1	10.1	11.5	14.0	16.2	13.1
Highest max., °C	44.7	44.6	41.3	37.6	32.4	28.1	26.3	27.8	32.7	37.3	40.3	42.3	44.7
Lowest min., °C	9.2	8.7	7.7	4.1	1.3	1.6	1.2	1.9	2.6	4.2	5.6	8.6	1.2
No. of days 30.0°C and over	15	15	10	3	—	—	—	—	—	1	4	9	55
No. of days 40.0°C and over	1	—	—	—	—	—	—	—	—	—	—	—	2
No. of days 2.0°C and under	—	—	—	—	—	—	—	—	—	—	—	—	—

TABLE 3.3 - TEMPERATURES AT REPRESENTATIVE CLIMATOLOGICAL STATIONS (*continued*)
(Stations are arranged from north to south in three groups: Coastal, Wheat Belt and Other Inland)

Reporting station and characteristic	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
COASTAL (<i>continued</i>)													
Bunbury—													
Mean max., °C	27.5	27.6	25.8	22.9	19.8	17.6	16.8	17.1	18.2	19.9	23.0	25.6	21.8
Mean min., °C	14.8	15.1	14.1	12.0	10.2	9.1	8.2	8.3	9.2	10.1	12.1	13.7	11.4
Highest max., °C	41.2	40.1	38.3	33.9	28.7	25.1	22.3	24.2	28.8	33.6	37.7	38.6	41.2
Lowest min., °C	5.6	5.2	4.1	2.6	0.1	0.3	-2.2	0.6	-1.1	0.6	4.0	3.6	-2.2
No. of days 30.0°C and over	9	9	4	—	—	—	—	—	—	—	1	5	30
No. of days 40.0°C and over	—	—	—	—	—	—	—	—	—	—	—	—	—
No. of days 2.0°C and under	—	—	—	—	—	—	—	—	—	—	—	—	—
Albany—													
Mean max., °C	25.8	25.4	24.2	21.0	18.5	16.3	15.7	15.5	16.7	18.8	21.1	23.9	20.2
Mean min., °C	13.3	13.9	12.9	11.6	9.5	8.1	7.4	6.8	7.4	9.0	10.4	12.4	10.2
Highest max., °C	45.6	41.6	40.5	38.8	32.6	23.6	22.5	24.1	27.8	33.1	41.1	41.1	45.6
Lowest min., °C	5.6	5.1	4.5	4.9	1.9	0	1.1	1.4	0.7	1.8	2.9	3.7	0
No. of days 30.0°C and over	4	4	4	1	—	—	—	—	—	—	1	3	16
No. of days 40.0°C and over	—	—	—	—	—	—	—	—	—	—	—	—	1
No. of days 2.0°C and under	—	—	—	—	—	—	—	—	—	—	—	—	1
Esperance—													
Mean max., °C	26.2	26.4	25.2	23.1	20.2	17.9	17.1	17.7	19.2	21.1	22.9	24.8	21.8
Mean min., °C	15.5	16.0	14.9	13.1	10.6	8.9	8.2	8.5	9.4	10.6	12.7	14.4	11.9
Highest max., °C	44.4	44.3	42.5	40.1	34.5	26.3	27.6	29.4	34.4	40.1	42.1	44.4	44.4
Lowest min., °C	8.3	8.0	7.5	5.7	2.9	2.2	2.3	2.5	2.7	3.6	5.8	7.2	2.2
No. of days 30.0°C and over	6	6	6	3	—	—	—	—	1	2	3	5	32
No. of days 40.0°C and over	1	1	—	—	—	—	—	—	—	—	—	1	3
No. of days 2.0°C and under	—	—	—	—	—	—	—	—	—	—	—	—	1
Eucla—													
Mean max., °C	24.9	24.6	24.7	22.9	20.9	18.7	17.8	18.8	20.6	21.8	22.7	23.8	21.8
Mean min., °C	16.5	16.7	16.1	13.4	10.2	8.2	6.9	7.5	8.9	10.9	13.2	15.1	11.9
Highest max., °C	50.7	48.9	44.4	41.4	35.8	33.3	32.1	34.9	40.0	43.1	46.7	49.3	50.7
Lowest min., °C	3.5	7.8	6.7	-0.2	0	-2.2	-2.2	-1.6	-0.6	-0.3	2.8	3.3	-2.2
No. of days 30.0°C and over	6	5	5	4	1	—	—	—	2	6	6	6	43
No. of days 40.0°C and over	2	1	1	1	—	—	—	—	—	—	—	1	6
No. of days 2.0°C and under	—	—	—	—	—	—	—	1	—	—	—	—	2
WHEAT BELT													
Carnamah—													
Mean max., °C	36.0	35.3	32.7	27.4	22.6	19.1	17.7	19.3	22.2	25.6	29.8	33.1	26.7
Mean min., °C	18.2	18.5	16.6	13.3	10.3	8.6	7.0	6.9	7.8	9.8	12.7	15.4	12.1
Highest max., °C	48.1	45.6	43.9	40.0	34.4	27.8	27.8	29.4	35.1	40.0	43.1	44.3	48.1
Lowest min., °C	5.1	6.9	6.7	1.7	1.1	0	0.6	0.7	1.0	1.1	2.3	6.7	0
No. of days 30.0°C and over	28	25	21	8	1	—	—	—	—	6	15	26	132
No. of days 40.0°C and over	5	7	2	—	—	—	—	—	—	—	1	4	18
No. of days 2.0°C and under	—	—	—	—	—	—	—	—	—	—	—	—	1
Wongan Hills—													
Mean max., °C	34.0	33.9	30.1	25.3	21.3	17.6	16.9	17.2	19.9	24.9	29.1	32.5	25.2
Mean min., °C	17.6	17.6	15.4	12.4	9.1	7.7	6.2	5.8	6.7	9.9	12.9	15.6	11.4
Highest max., °C	47.4	44.4	42.5	39.2	34.7	26.0	25.4	27.2	35.2	39.4	41.8	44.2	47.4
Lowest min., °C	8.8	9.5	5.6	2.8	-0.6	0.5	-0.9	-0.5	0.2	0.6	4.3	5.3	-0.9
No. of days 30.0°C and over	25	22	16	6	—	—	—	—	—	5	11	22	108
No. of days 40.0°C and over	4	4	—	—	—	—	—	—	—	—	—	2	10
No. of days 2.0°C and under	—	—	—	—	—	1	1	3	—	—	—	—	6
Kellerberrin—													
Mean max., °C	33.9	33.2	30.2	25.5	20.5	17.3	16.2	17.6	20.8	24.4	28.9	31.9	25.1
Mean min., °C	16.8	16.7	15.1	11.7	8.4	7.0	5.7	5.6	6.6	8.8	12.3	14.9	10.8
Highest max., °C	46.5	46.7	44.4	39.2	35.6	26.9	24.9	28.3	36.5	39.4	43.1	45.0	46.7
Lowest min., °C	7.2	6.1	4.0	1.1	-2.2	-2.2	-2.0	-1.3	-1.0	0.3	1.7	5.4	-2.2
No. of days 30.0°C and over	25	21	15	5	—	—	—	—	—	5	12	20	102
No. of days 40.0°C and over	4	2	—	—	—	—	—	—	—	—	—	1	7
No. of days 2.0°C and under	—	—	—	—	1	2	3	5	2	—	—	—	13
Southern Cross—													
Mean max., °C	34.7	33.8	30.7	25.7	20.6	17.1	16.3	18.2	22.1	25.6	30.1	33.2	25.7
Mean min., °C	17.1	16.9	14.9	11.1	7.4	5.6	4.2	4.6	6.3	9.0	12.7	15.3	10.4
Highest max., °C	46.1	47.2	44.4	39.6	33.3	27.5	26.7	30.6	34.8	39.3	43.4	45.9	47.2
Lowest min., °C	5.6	5.6	3.4	-1.1	-3.3	-4.3	-5.0	-3.9	-3.3	-1.1	1.1	3.4	-5.0
No. of days 30.0°C and over	27	23	17	6	—	—	—	—	1	7	14	24	118
No. of days 40.0°C and over	5	2	1	—	—	—	—	—	—	—	1	2	11
No. of days 2.0°C and under	—	—	—	—	2	4	8	8	4	1	—	—	26

TABLE 3.3 - TEMPERATURES AT REPRESENTATIVE CLIMATOLOGICAL STATIONS (continued)
(Stations are arranged from north to south in three groups: Coastal, Wheat Belt and Other Inland)

Reporting station and characteristic	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
WHEAT BELT (continued)													
Northam—													
Mean max., °C	33.9	33.5	30.6	26.1	20.7	17.6	16.6	17.8	20.5	23.5	28.4	31.9	25.1
Mean min., °C	17.0	16.9	15.3	11.8	8.4	6.4	5.4	5.7	7.1	8.9	12.4	15.3	10.9
Highest max., °C	46.2	46.7	43.9	39.5	35.1	27.2	24.4	28.0	34.6	39.4	44.1	45.6	46.7
Lowest min., °C	7.3	7.5	5.5	0.6	-2.7	-3.9	-2.1	-1.1	-1.0	0.4	2.1	5.6	-3.9
No. of days 30.0°C and over	25	22	16	6	—	—	—	—	—	4	10	22	107
No. of days 40.0°C and over	4	4	—	—	—	—	—	—	—	—	—	2	10
No. of days 2.0°C and under	—	—	—	—	1	3	3	4	2	—	—	—	14
Wandering—													
Mean max., °C	31.6	30.9	28.2	23.6	18.8	15.8	14.9	15.9	18.1	21.0	25.8	29.4	22.8
Mean min., °C	13.6	13.4	11.8	8.7	6.2	4.9	3.9	4.0	4.9	6.1	8.9	11.8	8.2
Highest max., °C	45.6	44.6	41.9	37.2	33.2	25.0	23.8	26.1	30.9	36.9	39.8	42.8	45.6
Lowest min., °C	3.3	2.8	-0.6	-2.2	-5.6	-5.7	-4.4	-3.9	-3.5	-2.6	-1.7	1.0	-5.7
No. of days 30.0°C and over	20	17	11	3	—	—	—	—	—	2	7	16	76
No. of days 40.0°C and over	2	1	—	—	—	—	—	—	—	—	—	1	3
No. of days 2.0°C and under	—	—	—	1	6	7	9	11	9	5	1	—	48
Narrogin—													
Mean max., °C	30.9	40.0	26.7	22.2	18.1	15.0	14.5	14.6	16.7	20.9	25.1	29.2	22.0
Mean min., °C	14.7	14.5	12.8	10.4	7.4	6.8	5.3	5.0	5.8	8.0	10.4	12.5	9.5
Highest max., °C	43.7	42.8	40.9	36.1	32.2	26.2	22.2	24.9	36.4	37.8	42.1	43.2	43.7
Lowest min., °C	4.3	3.9	3.3	—	-1.4	-2.7	-2.7	-2.7	-3.0	1.7	—	1.8	-3.0
No. of days 30.0°C and over	16	14	8	2	—	—	—	—	—	1	5	14	57
No. of days 40.0°C and over	1	1	—	—	—	—	—	—	—	—	—	—	2
No. of days 2.0°C and under	—	—	—	—	1	2	4	5	3	—	—	—	17
Katanning—													
Mean max., °C	30.3	29.4	26.7	22.7	18.2	15.4	14.3	15.4	17.7	20.6	25.2	28.4	22.1
Mean min., °C	13.4	13.5	12.4	10.2	7.8	6.6	5.3	5.5	6.3	7.6	9.9	12.1	9.2
Highest max., °C	43.8	44.6	41.7	36.1	32.3	24.1	22.2	31.1	30.6	37.8	41.1	43.3	44.6
Lowest min., °C	5.0	3.3	1.7	0.6	-1.1	-2.1	-3.9	-2.2	-1.2	-0.6	1.7	2.7	-3.9
No. of days 30.0°C and over	17	13	8	1	—	—	—	—	—	1	5	12	58
No. of days 40.0°C and over	1	1	—	—	—	—	—	—	—	—	—	—	2
No. of days 2.0°C and under	—	—	—	—	1	2	3	4	2	—	—	—	13
OTHER INLAND													
Halls Creek—													
Mean max., °C	37.0	36.3	35.7	34.2	29.7	27.4	26.9	29.8	34.0	37.4	38.5	38.3	33.8
Mean min., °C	24.3	23.8	22.9	20.4	17.0	13.8	12.3	14.5	18.5	22.7	24.3	24.6	19.9
Highest max., °C	44.3	43.8	42.1	39.9	37.2	35.0	34.0	37.8	40.2	43.8	43.8	44.9	44.9
Lowest min., °C	15.6	12.2	11.0	7.2	2.4	0.2	-1.1	0.4	3.0	8.9	11.7	12.1	-1.1
No. of days 30.0°C and over	30	27	30	28	17	6	6	16	27	30	30	30	279
No. of days 40.0°C and over	6	4	2	—	—	—	—	—	—	3	8	9	31
No. of days 2.0°C and under	—	—	—	—	—	—	—	—	—	—	—	—	—
Marble Bar—													
Mean max., °C	41.0	40.0	39.1	36.0	30.6	27.0	26.7	29.5	33.9	37.4	40.5	41.6	35.3
Mean min., °C	26.1	25.6	24.6	21.1	16.4	12.9	11.6	13.2	16.6	20.1	23.6	25.4	19.8
Highest max., °C	48.8	47.8	45.0	42.2	37.8	35.6	33.9	37.0	41.9	45.6	46.8	47.3	48.8
Lowest min., °C	18.9	17.8	17.5	12.3	7.2	3.3	2.2	4.4	8.3	12.2	16.1	17.8	2.2
No. of days 30.0°C and over	30	27	31	28	18	6	4	13	26	30	30	30	273
No. of days 40.0°C and over	19	14	12	2	—	—	—	—	—	8	16	23	94
No. of days 2.0°C and under	—	—	—	—	—	—	—	—	—	—	—	—	—
Meekatharra—													
Mean max., °C	37.8	35.9	34.3	28.9	23.6	19.6	18.6	20.7	24.9	29.6	33.5	36.3	28.6
Mean min., °C	24.2	23.1	21.3	16.8	11.9	9.2	7.3	8.1	11.1	15.1	18.9	22.2	15.8
Highest max., °C	44.9	44.3	43.6	38.8	34.3	28.3	28.8	32.6	37.7	40.2	42.3	45.0	45.0
Lowest min., °C	12.2	12.3	10.3	5.8	1.7	-3.1	-0.2	0.1	-0.6	5.2	7.2	11.1	-3.1
No. of days 30.0°C and over	30	26	27	13	2	—	—	—	4	14	23	29	169
No. of days 40.0°C and over	10	6	2	—	—	—	—	—	—	—	1	4	22
No. of days 2.0°C and under	—	—	—	—	—	—	1	—	—	—	—	—	2
Laverton—													
Mean max., °C	36.3	34.3	32.0	27.8	22.6	19.1	17.7	19.9	24.2	28.7	32.3	34.2	27.4
Mean min., °C	21.0	19.9	18.1	14.7	9.9	7.7	5.4	6.2	9.4	13.7	16.8	19.1	13.5
Highest max., °C	46.1	46.1	44.4	40.0	35.0	30.2	30.1	33.9	36.8	40.6	43.9	45.6	46.1
Lowest min., °C	7.2	7.5	6.1	2.8	-0.9	-2.8	-4.2	-2.8	-1.1	2.2	4.4	10.0	-4.2
No. of days 30.0°C and over	28	23	20	12	2	—	—	—	4	13	21	25	147
No. of days 40.0°C and over	8	4	2	—	—	—	—	—	—	—	2	3	18
No. of days 2.0°C and under	—	—	—	—	1	2	6	4	—	—	—	—	12

TABLE 3.3 - TEMPERATURES AT REPRESENTATIVE CLIMATOLOGICAL STATIONS (*continued*)
(Stations are arranged from north to south in three groups: Coastal, Wheat Belt and Other Inland)

Reporting station and characteristic	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
OTHER INLAND (<i>continued</i>)													
Kalgoorlie—													
Mean max., °C	33.6	32.0	29.5	25.2	21.0	17.8	16.5	18.2	21.7	26.1	29.4	32.0	25.3
Mean min., °C	18.3	7.7	15.8	12.3	8.3	6.7	4.8	5.1	7.3	11.0	14.0	16.5	11.5
Highest max., °C	46.4	46.1	44.5	39.2	33.3	27.6	28.1	30.6	36.8	40.7	41.7	45.0	46.4
Lowest min., °C	8.4	8.6	5.3	1.7	-1.8	-3.0	-3.4	-2.4	-0.6	-1.0	3.4	5.5	-3.4
No. of days 30.0°C and over	24	18	14	5	—	—	—	—	1	6	12	21	100
No. of days 40.0°C and over	3	2	1	—	—	—	—	—	—	—	—	2	8
No. of days 2.0°C and under	—	—	—	—	1	4	8	6	1	—	—	—	20
Rawlinna—													
Mean max., °C	32.9	31.7	29.6	25.5	21.7	18.6	17.9	19.8	23.4	26.3	29.6	31.7	25.7
Mean min., °C	15.3	15.1	14.3	11.3	8.1	5.9	4.4	5.1	7.4	9.8	12.2	14.2	10.3
Highest max., °C	47.9	46.4	44.7	40.0	35.0	31.3	29.7	33.9	39.3	41.7	45.6	45.7	47.9
Lowest min., °C	5.6	5.0	6.1	1.7	—	-2.7	-2.3	-3.2	-0.6	0.7	0.8	5.1	-3.2
No. of days 30.0°C and over	23	17	14	7	1	—	—	—	3	9	14	19	106
No. of days 40.0°C and over	5	3	2	—	—	—	—	—	—	—	1	3	13
No. of days 2.0°C and under	—	—	—	—	1	3	7	4	1	—	—	—	16
Collie—													
Mean max., °C	31.1	30.6	27.7	22.4	19.1	16.5	15.6	16.3	18.0	21.3	24.8	28.9	22.7
Mean min., °C	14.2	14.1	12.3	9.5	7.1	6.2	4.7	4.7	6.1	7.8	10.2	12.6	9.1
Highest max., °C	44.4	43.4	40.8	36.7	30.4	24.4	22.8	26.1	30.3	36.3	38.8	41.7	44.4
Lowest min., °C	3.2	1.8	0.2	-1.3	-2.2	-4.0	-3.9	-3.2	-2.2	-0.6	0.3	1.7	-4.0
No. of days 30.0°C and over	19	15	10	2	—	—	—	—	—	1	5	13	63
No. of days 40.0°C and over	1	—	—	—	—	—	—	—	—	—	—	—	2
No. of days 2.0°C and under	—	—	—	1	3	5	6	8	4	1	—	—	28
Manjimup—													
Mean max., °C	26.6	26.5	24.3	20.6	17.1	15.1	14.0	14.8	16.4	18.3	21.5	24.3	19.9
Mean min., °C	12.6	12.7	12.0	10.1	8.3	7.1	5.8	6.0	6.8	7.8	9.6	11.2	9.2
Highest max., °C	41.7	41.2	38.9	33.9	29.2	22.9	21.7	24.7	28.1	33.3	37.4	38.8	41.7
Lowest min., °C	5.6	4.4	3.3	1.6	1.1	0.2	-2.8	-1.1	-0.6	0.1	1.7	4.4	-2.8
No. of days 30.0°C and over	10	10	5	—	—	—	—	—	—	—	1	7	33
No. of days 40.0°C and over	—	—	—	—	—	—	—	—	—	—	—	—	—
No. of days 2.0°C and under	—	—	—	—	—	1	—	1	—	—	—	—	2
Pemberton—													
Mean max., °C	25.9	25.8	23.9	20.4	17.6	15.6	14.6	15.3	16.4	18.3	21.1	23.4	19.8
Mean min., °C	12.9	13.2	12.6	10.6	8.9	8.2	6.9	6.6	7.2	8.1	9.8	11.6	9.7
Highest max., °C	41.7	40.1	38.9	33.9	28.3	23.2	22.0	25.6	28.3	41.2	39.0	38.5	41.7
Lowest min., °C	4.4	4.4	3.9	2.7	—	-0.4	-1.4	-1.1	-0.3	0.6	2.1	3.9	-1.4
No. of days 30.0°C and over	8	8	4	1	—	—	—	—	—	1	1	5	29
No. of days 40.0°C and over	—	—	—	—	—	—	—	—	—	—	—	—	—
No. of days 2.0°C and under	—	—	—	—	—	—	1	1	1	—	—	—	3
Mount Baker—													
Mean max., °C	27.4	26.3	24.7	21.0	18.1	15.5	14.8	15.0	16.5	19.2	21.8	24.9	20.4
Mean min., °C	13.3	13.6	12.7	10.8	8.7	7.5	6.5	6.0	6.7	8.3	10.0	12.0	9.7
Highest max., °C	43.9	43.6	40.6	37.2	32.2	24.3	22.2	25.0	29.3	35.6	39.4	42.9	43.9
Lowest min., °C	1.7	3.9	3.6	2.2	0.6	—	-0.4	-1.3	-0.6	0.6	1.1	1.1	-1.3
No. of days 30.0°C and over	10	8	5	1	—	—	—	—	—	—	2	6	32
No. of days 40.0°C and over	—	—	—	—	—	—	—	—	—	—	—	—	1
No. of days 2.0°C and under	—	—	—	—	—	—	1	1	—	—	—	—	2

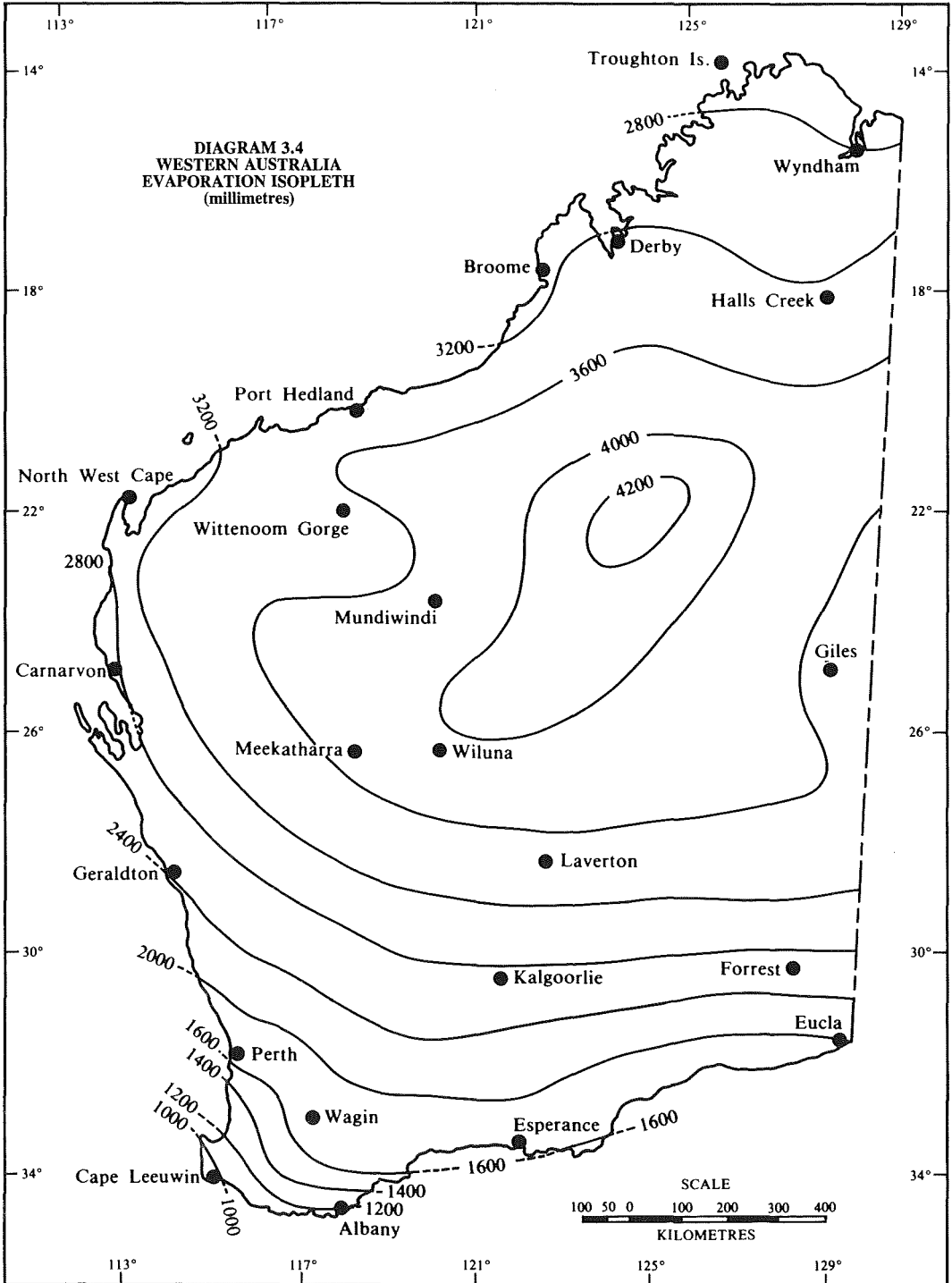
THUNDERSTORMS

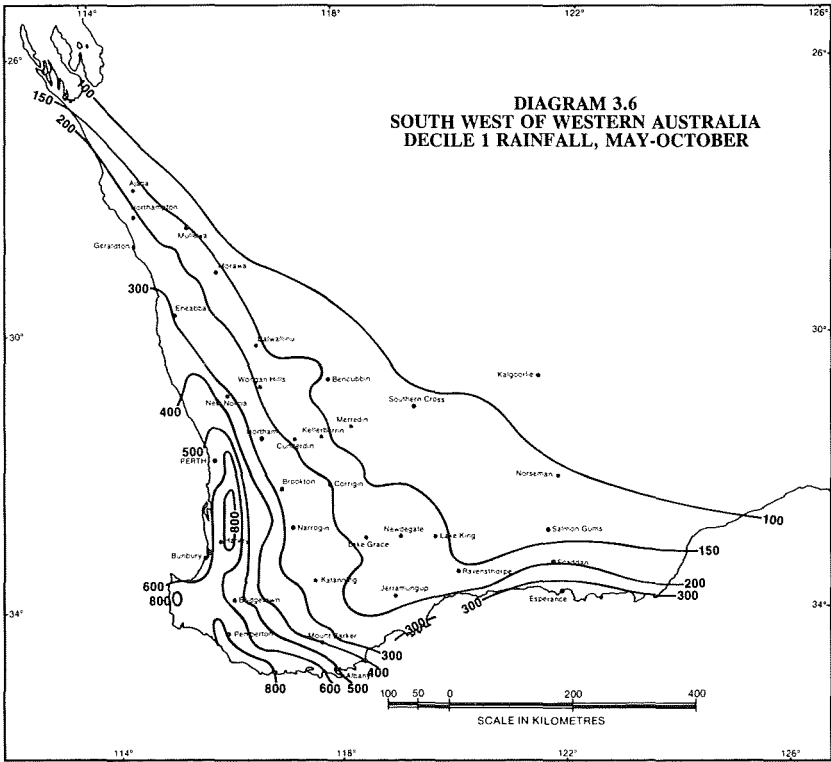
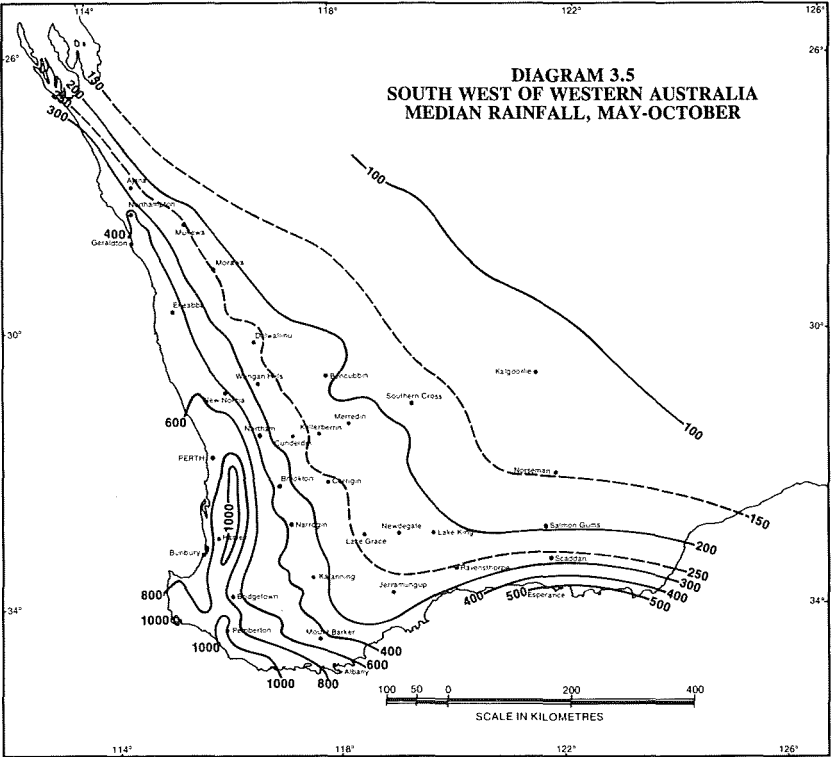
Thunderstorms are frequent in the Kimberley during the 'Wet' season but are practically unknown in the 'Dry'.

In most of the State south from the tropics thunderstorms are most frequent in the summer months but in the south-west they are more uniformly distributed and in many

places in coastal districts they are most frequent in winter.

The winter storms are often accompanied by hail which, however, is usually not heavy enough to cause damage. Hail accompanying summer storms can be much heavier, and occasionally damages ripening crops in the wheat belt. Both winter and summer thunderstorms may be accompanied by severe squalls, but these are infrequent.





EVAPORATION

Except for the lower south-west, evaporation from a free water surface exceeds the annual rainfall, and in a large proportion of the State it is more than ten times greater than the rainfall.

It is least in the winter months, amounting in July to less than fifty millimetres in the far south-west, and to about 225 millimetres in the northern tropics. In January, when evaporation is highest, it totals about 200 millimetres on the far south coast and reaches 500 millimetres in the East Gascoyne and North-Eastern Meteorological Districts. Further north, evaporation is reduced by the moister air over the tropics at this time of the year.

The average annual evaporation throughout the State, measured using the Class A pan evaporimeter with bird guard, is shown on Diagram 3.4.

GROWING SEASON RAINFALL

Crop production in the agricultural districts of the south-west of the State is dependent on the winter rains. The bulk of the useful rainfall for this purpose occurs in the six-month period between May and October. The median (50 percentile) value of the rainfall in this period is shown in Diagram 3.5. The decile 1 (10 percentile) rainfall, (i.e. the rainfall total which on average is not exceeded in one year in ten) for the same period is shown in Diagram 3.6.

METROPOLITAN CLIMATE

Perth has more sunshine and a greater number of clear days during the year than any other State capital city. It also has the wettest winter, the driest summer, and is the windiest of the capital cities. The highest temperature on record for Perth is 44.7°C (12 January 1978) and the lowest 1.2°C (7 July 1916).

TABLE 3.4 - CLIMATOLOGICAL DATA—PERTH BUREAU OF METEOROLOGY

Month	Wind				Temperature				Relative humidity (Saturation = 100%)		Sunshine Mean daily amount	Cloud (proportion of sky covered)—Mean of readings at 9 a.m. and 3 p.m. and 9 p.m.	Evaporation Mean daily amount
	Prevailing direction		Speed		Highest in sun	Lowest terrestrial	Mean	At 3 p.m.					
	9 a.m.	3 p.m.	Aver- age	High- est									
Number of years of observations	30 (a)	30 (a)	63	63	81	30 (a)	30 (a)	30 (a)	13 (b)				
			km/h	°c	date	°c	date	%	%	hours	%	mm	
January	E	SSW	17.5	89	80.7	22/1914	4.2	20/1925	53	43	10.4	29	9.3
February	ENE	SSW	17.2	113	78.7	4/1934	4.3	1/1913	52	43	9.8	31	8.9
March	E	SSW	16.2	113	75.0	19/1918	2.6	(c)	57	46	8.8	35	7.1
April	ENE	SSW	13.7	130	69.4	8/1916	-0.7	26/1960	60	48	7.5	42	4.4
May	NE	WSW	13.5	119	63.3	4/1925	-3.9	31/1964	68	58	5.7	54	3.0
June	N	NW	13.5	128	57.5	9/1914	-3.4	27/1946	72	63	4.8	59	2.3
July	NNE	W	14.2	137	56.2	13/1915	-3.8	30/1920	73	63	5.4	56	2.4
August	N	WNW	15.1	156	62.8	29/1921	-3.0	18/1966	71	60	6.0	56	2.8
September	ENE	SSW	15.1	113	67.5	29/1916	-2.7	(d)	64	57	7.2	49	4.0
October	SE	SW	16.1	104	71.8	19/1954	-1.2	16/1931	64	54	8.1	48	5.7
November	E	SW	17.2	102	75.0	30/1925	-1.1	1/1968	57	47	9.6	39	7.1
December	E	SSW	17.7	102	76.0	11/1927	3.3	29/1957	54	46	10.4	32	8.7
Year—													
Average	E	SSW	15.6	..	80.7	22/1/14	-3.9	31/5/64	62	52	7.8	44	..
Extremes	..	..	..	156	80.7	22/1/14	-3.9	31/5/64	..	..	..	..	..

(a) Standard 30 year's normal (1911-1940). (b) Class A Pan 1967-1979. Correction of + 7% applied for bird screen. (c) Recorded on 8 March 1903 and 16 March 1967. (d) Recorded on 8 September 1952 and 6 September 1956.

SNOW

Snow has been known to fall as far north as Wongan Hills, but it is only in the southern districts that it occasionally lies on the

ground. It is seen on top of the Stirling Ranges for a short time nearly every winter, but elsewhere is very infrequent and of negligible importance.

Chapter 4

FLORA AND FAUNA

The Vegetation of Western Australia ⁽¹⁾

Contributed by T.E.H. Aplin and P.G. Wilson
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The flora of Western Australia consists of about 8,000 species of flowering plants (angiosperms), 15 cycads and conifers (gymnosperms) and 50 ferns. The families of flowering plants which characterise the flora are also widespread throughout Australia, e.g. Myrtaceae, Proteaceae and Leguminosae. The Stylidiaceae, Goodeniaceae and Epacridaceae, which are poorly represented outside Australia, are well developed in Western Australia. Large groups of plants that are almost wholly endemic in this State are the *Chloanthaceae*, *Prostantheroideae* (Lamiaceae), *Persoonieae* and *Banksieae* (Proteaceae) and *Epacrideae* (Epacridaceae). At the generic level there are forty-seven monotypic genera, most of which are endemic in the South-West Province, while at the species level 2,472, or 68 per cent of species in the South-West are endemic, although it has been suggested that the degree of endemism may approach 75-80 per cent.

Climatically, Western Australia shows a marked variation from a predominantly summer rainfall pattern in the north to a characteristically Mediterranean-type winter rainfall pattern in the south. Between these two rainfall systems is a large region whose climate is characterised by the extreme variability of the rainfall both annually and seasonally. ⁽²⁾ The vegetation of Western Australia is determined by these varying climatic patterns, although local changes in geology, soils, topography and drainage may affect the structure and/or the floristic composition of plant communities. The delineation of the present day vegetation also reflects the past tectonic and climatic history of the Australian continent.

It is generally accepted that in the Palaeozoic era the Australian continent was united with the continents of Africa, Antarctica, India and South America in a once common land-mass known as Gondwana. During this period these continents had a common flora as exemplified by the *Glossopteris* elements. In the late Neocomian period (Early Cretaceous), rifting between India (with Africa and South America) and Australia (with Antarctica) was initiated. In Eocene times (Early to Mid-Tertiary), sea-floor spreading between Australia and Antarctica commenced and for the first time the southern coasts were warmed by the entering Indian Ocean. The early Tertiary flora of the South-West Province contained several sub-tropical rainforest and mangrove genera in abundance. The Australian continental block was isolated at about the time the pan-Australian flora began to develop, and the northward drift of the continent which brought the Australian block into contact with the Asian block in the middle Miocene period (Late Tertiary) allowed the entry of a different flora, the 'Indo-Malayan' flora.

The degree of endemism and diversification in the south-western flora, which had its origin in pre-Miocene times, was brought about largely by the isolation caused by the late Eocene and Miocene seas which inundated the Nullarbor Shelf. Another factor that contributed to the diversification of the flora was the lateritisation that occurred in the Tertiary period, with the subsequent dissection of the lateritic landscape causing fragmentation of a once continuous flora.

(1) See Appendix for reference to additional information in earlier issues of the Year Book.

(2) See Chapter 3,—Climate and Meteorology.

FORMATIONS AND ALLIANCES

The classification of vegetation involves the groupings of similar structural units and the grouping or classification of the floristic components present in all strata of plant communities that form part of the vegetation.

TABLE 4.1 - PLANT COMMUNITIES—MAJOR STRUCTURAL FORMATION

Life-form and height of tallest stratum	Projective foliage cover of tallest stratum, as per cent	Description
Trees over 30 m	70-100 30-70 10-30 under 10	High closed forest High open forest High woodland High open woodland
Trees 10-30 m	70-100 30-70 10-30 under 10	Closed forest Open forest Woodland Open woodland
Trees under 10 m	70-100 30-70 10-30 under 10	Low closed forest Low open forest Low woodland Low open woodland
Shrubs over 2 m	70-100 30-70 10-30 under 10	Closed scrub Open scrub High shrubland High open shrubland
Shrubs 1-2 m	70-100 30-70 10-30 under 10	Closed heath Open heath Shrubland Open shrubland
Shrubs under 1 m	70-100 30-70 10-30 under 10	Low closed heath Low open heath Low shrubland Low open shrubland
Herbs	70-100 30-70 10-30	Closed herbland, closed tussock grassland, closed sedgeland, etc. Herbland, tussock grassland, sedgeland, etc. Open herbland, open tussock grassland, open sedgeland, etc.
Hummock grasses	10-30 under 10	Hummock grassland Open hummock grassland

BOTANICAL PROVINCES AND DISTRICTS

The vegetation of Western Australia has been sub-divided into three Botanical Provinces. The areas that these provinces occupy are determined largely by climatic pattern. Within each province are smaller regions, known as Botanical Districts, in which the structure and floristics of the vegetation are

determined partly by climate and partly by geology and soils. The boundaries of these provinces and districts are shown in Diagram 4.1.

The Northern Province

The Northern Province, or Tropical Zone, is characterised by a dry monsoonal climate. The rainfall received in the summer months ranges from less than 500mm to over 1,250mm per annum. The annual mean maximum temperature is over 30°C. The evaporation rate ranges from 2,000-2,500mm per annum.

The vegetation formation consists of grassy *Eucalyptus* open forests and woodlands. The major components are 'Australian' elements, with 'Indo-Malayan' elements as minor components. The latter are usually found in special habitats such as streamlines or scarps. Some important 'Indo-Malayan' genera are *Ficus* (Moraceae), *Barringtonia* (Lecythidaceae) and *Terminalia* (Combretaceae).

The Gardner Botanical District. The Gardner botanical district, commonly referred to as the Kimberley Plateau, consists of a series of sandstone, shale, quartzite and volcanic rocks. The topography varies from alluvial flats, through rolling to hill landscape to very rugged dissected plateau. Saline mud flats are present along estuaries.

On the volcanic rocks and shales, on gently undulating to hilly topography, the woodland and open woodland formations consist mainly of *E. Tectifica-E. grandifolia* alliance. *E. tectifica* sub-alliance is restricted to the volcanic soils while *E. grandifolia* sub-alliance is developed on the shales and sandstones. *E. latifolia* and *E. papuana* alliances characterise the flats and levee soils.

On the sandstone and quartzite rocks, ranges and hogbacks, the woodland, open woodland and low open woodland formations are mainly made up of *E. tetradonta-E. miniata* alliance. In this alliance, *E. tetradonta* sub-alliance is found mainly in the northern high-rainfall region while *E. phoenicea-E. ferruginea* (Scarlet Gum-Rusty Bloodwood) sub-alliance is its southern lower-rainfall counterpart.

Other alliances and associations found in the Gardner botanical district are *Terminalia*

spp.-*Dichanthium* spp. woodland and grassland communities, on soils of heavy texture; *E. brevifolia*, *E. argillacea* and *Melaleuca viridiflora* associations on podsols, over shales and sandstones; fringing communities of *E. camaldulensis* and *Terminalia* spp.-*Ficus* spp.-*Melaleuca* spp.; and mangrove communities on the estuarine mud flats. Closed mixed forests of 'Indo-Malayan' elements such as *Calophyllum*, *Ficus*, *Carallia*, *Barringtonia*, *Nauclea*, *Randia* and *Myristica* and *Melaleuca leucadendron* (Cadjaput) fringe gullies, while semi-deciduous vine thickets with lianes such as *Aristolochia*, *Capparis*, *Cansjera*, *Adenia* and *Canavalia* occur in small pockets.

The Hall Botanical District. In the Hall botanical district, the low open woodlands of *E. pruinosa* association are the low-rainfall counterparts of *E. tectifera* woodlands and occur on soils derived from basic rocks. *E. brevifolia* association is generally seen on skeletal soils on acid rocks, and also on many other soils. Low open woodlands of *Terminalia* spp. alliance occur on cracking clay soils formed on volcanics and limestone. Tussock grasslands with *Astrebla*, *Dichanthium*, *Chrysopogon* and *Panicum* occur on high-level plains of Tertiary alluvia. The rugged hilly country of the Halls Creek ridges carries *E. brevifolia* and *E. pruinosa* low open woodland associations over *Triodia intermedia*. The gently undulating plains with calcareous soils carry arid short grass communities of *Enneapogon* (Bottle Washers), *Aristida* and *Sporobolus*.

The Fitzgerald Botanical District. The Fitzgerald botanical district consists essentially of mountain ranges, plateaus and steep-sided valleys. The ranges and plateaus are made up of quartzite and shale-sandstone with lateritic remnants, lightly covered with a thin soil mantle. The vegetation comprises mainly low open woodland of *E. brevifolia*, *E. dichromophloia* and *E. phoenicea*-*E. ferruginea* communities, with a patchy shrub layer and *Plectrachne pungens* as the main ground component.

The Dampier Botanical District. The Dampier botanical district is a region in which a great thickness of gently folded sedimentary rock, of Palaeozoic and Mesozoic age, overlies a Precambrian basement of crystalline rock.

The basement outcrops along the north and east of the basin.

The upland regions consist of low hills and stony plains with granite domes, gneiss, hills, schist ridges and gently sloping sandy plateaus. The vegetation formations consist of low open woodland formations of *Eucalyptus* species with a hummock grassland ground layer. The main alliance of *E. brevifolia* is represented by a number of associations. One noteworthy association is *Grevillea pyramidalis*. The hummock grassland layer consists of the genera *Triodia* and *Plectrachne* is almost pure stands of species. A short grass ground storey with *Enneapogon* and *Aristida* may be seen on the interfluvies and hill-foot slopes to the south-east. The drainage floors usually carry low open woodland formations of *E. dichromophloia* and *E. tectifera* alliances. The grass layer includes the genera *Chrysopogon*, *Sehima*, *Sorghum* and *Dichanthium*.

The Dampier botanical district contains extensive areas of sandy plains which lack surface drainage. The dominant layer in the vegetation is composed of *Acacia*, the more important species being *A. tumida*, *A. eriopoda*, *A. pachycarpa*, *A. holosericea* and *A. monticola*. *E. dichromophloia* and *E. zygophylla* make up the tallest stratum of the low woodland formation containing these *Acacia* species. Other tree genera include *Gyrocarpus*, *Atalaya*, *Hakea*, *Grevillea*, *Lysiphyllum*, *Persoonia* and *Erythrophleum*, with the occasional *Adansonia*. In the high rainfall area, a woodland formation of *E. miniata* alliance is present. This alliance also has a strong layer of *Acacia* shrubs. In this district *E. tetradonta* is not associated with *E. miniata* as it is in the Gardner botanical district.

The Eremaean Province

The Eremaean Province, which lies between the predominantly summer and predominantly winter rainfall patterns of the north and the south-west, respectively, is intermediate in character. The rainfall, which over most of the province is less than 400 mm per annum, is received either from extensions of summer rainfall southward or from northern extensions of the southern winter systems. The vegetation of the province varies from woodland, high shrubland,

low shrubland to hummock grassland. Eleven botanical districts have been broadly recognised, seven of them in the desert area.

The Fortescue Botanical District. The Fortescue botanical district, usually placed in the Northern Province, consists of the Pilbara block. The vegetation of the narrow coastal strip carries grasslands of *Eragrostis* and *Eriachne* and low open shrublands of *Acacia translucens*-*A. inaequilatera* alliance. *Acacia pyrifolia* high open shrubland alliance is present on granite and basalt soils. High shrubland and low woodland *A. aneura* alliance is found along the major valleys and southern flanks of the Hamersley Range. On the Proterozoic rocks of the Hamersley Range the characteristic vegetation is a low open woodland formation, with *E. leucophloia* alliance. Hummock grassland ground layer found on stony soils consists mainly of *Triodia wiseana* and *T. basedowii*. Low woodland formations of *E. dichromophloia*-*E. setosa*, with *Triodia basedowii* as ground cover, occur on the sand plains.

The Ashburton and Austin Botanical Districts. The Ashburton and the Austin botanical districts are separated by rainfall patterns. The former, with its rainfall more likely to occur in summer, and the latter, with its rainfall more likely to occur in winter, both carry extensive low woodland and high shrubland formations of *A. aneura* alliance but, whereas the northern alliance is associated more with grass genera such as *Aristida*, *Eragrostis*, *Eriachne*, *Panicum*, *Brachiaria*, *Triodia* and *Setaria*, the southern alliance is associated more with genera such as *Danthonia*, *Eremophila*, *Maireana*, *Helipterum*, *Cephalopterum*, *Velleia*, *Swainsona* and other herbaceous annuals. *A. aneura* alliance consists of a number of sub-alliances and associations. *Maireana pyramidata* is associated with *A. aneura* on saline alluvial plains. Other woody genera that are prominent in the *A. aneura* alliance are *Hakea*, *Grevillea*, *Atriplex*, *Frankenia*, *Plagianthus*, *Alectryon* and *Bracychiton*.

The Carnarvon Botanical District. The Carnarvon botanical district, a sedimentary basin in which the exposed surface rocks range from Permian to Recent in age, is mostly low-lying. The vegetation on the northern plains consists of *Acacia xiphophylla* high open shrubland with

Triodia basedowii as ground cover. On the sand plains the vegetation is predominantly *Acacia pyrifolia* open shrubland, with scattered *Owenia reticulata*, and with *Triodia pungens* and *Plectrachne schinzii* as ground cover. On Cape Range *E. dichromophloia* low open woodland, with *Triodia pungens* and *T. wiseana*, is to be seen. *Acacia* species such as *A. coriacea*, *A. ramulosa*, *A. sclerosperma*, *A. xiphophylla*, *A. tetragonophylla*, *A. grasbyi* and *A. ligulata* form high open shrubland or low open woodland communities with shrub species of other genera over a wide area of this botanical district. On alluvial flats the low shrub understorey layer consists of species of *Maireana* and *Atriplex*. *Halosarcia* low open shrubland occupies the wetter sites. On Kennedy Range a mixed open shrubland with *Triodia basedowii* and *T. pungens* as ground cover is present.

The Canning, Mueller, Kearland, Carnegie, Giles and Helms botanical districts make up the desert region of Western Australia.

The Canning and Mueller Botanical Districts. The Canning and Mueller districts contain extensive areas of high shrubland with several species of *Acacia* dominating. On the sandy plains the dominant species is *A. pachycarpa* with *Triodia pungens* as ground cover. Scattered trees of *Eucalyptus* sp. (Desert Bloodwood) are present on the dunes. *Owenia reticulata* (Desert Walnut) is the principal low tree species in the north-western sector. *E. pachyphylla* and *E. odontocarpa* are prominent in the north-eastern sector, while woodlands of *Allocasuarina decasneana* are also of local importance there, in the interdunes.

The Keartland Botanical District. The Keartland district has a noticeable abundance of *Thryptomene maisonneuvei* and other *Myrtaceae* in the high shrubland formation. The Desert Bloodwood is present on the dunes, together with *Plectrachne schinzii*. *A. aneura* is of local importance, on small hills and mesas, with *Triodia pungens*. Hills of igneous rocks are covered with *Plectrachne melvillei*.

The Carnegie Botanical District. The Carnegie district carries extensive areas of *A. aneura*, with *Danthonia* and seasonal ephemerals. On the rises of the lateritic plains hummock grasslands of *Triodia basedowii* and high shrublands with *E. kingsmillii*

merge in with the *A. aneura* which tend to thin out. Desert Bloodwood, *Allocasuarina decaisneana*, and *E. coolabah* become more local in distribution, while *Plectrachne schinzii* is increasingly replaced by *Thryptomene maisonneuvei* southwards.

The Giles Botanical District. The Giles district consists of ranges with sandhill country between them, somewhat similar to the Carnegie district. *Allocasuarina decaisneana* groves are very common in sandhill country between the ranges. *Triodia basedowii* and *Plectrachne schinzii* provide ground cover. On the ranges the high shrubland is made up predominantly of *Acacia* spp. including *A. aneura*, with *Eremophila*, *Hakea*, *Grevillea* and *Eucalyptus* as co-dominants in some areas. *Callitris columellaris* is locally dominant. *Triodia basedowii* and *Plectrachne melvillei* form the hummock grassland ground layer.

The Helms Botanical District. The Helms district contains extensive areas of *A. aneura* alliance. A high shrubland formation characterised by *E. youngiana* alliance is also well developed. Associated with the shrubland community are other tall shrubs such as *Hakea*, *Acacia*, *Melaleuca*, *Grevillea* and other *Eucalyptus* species. Patches of open woodland of *E. gongylocarpa* are restricted apparently to areas where the sand is deeper. The hummock grass associated with *E. youngiana* and *E. gongylocarpa* is *Triodia basedowii*.

The Eucla Botanical District. The Eucla botanical district, commonly referred to as the Nullarbor Plain, is dominated by a low shrubland formation of *Maireana sedifolia*. *Atriplex*, *Stipa* and seasonal ephemerals are well represented. Towards the margin a low open woodland of *Acacia sowdenii* alliance, with a shrubland understorey of *Maireana* and *Atriplex*, becomes more and more evident. To the north this is replaced by a low woodland made up of *Acacia aneura*, *Casuarina cristata* and *Myoporum platycarpum*. Along the coastal strip low woodlands of *E. socialis*, *E. gracilis* and *A. sowdenii* alliances are to be seen on the ridges and flats, respectively. *E. transcontinentalis*-*E. flocktoniae* woodland alliance, found in the extreme south-western portion, forms a continuum with a similar formation in the Coolgardie botanical district.

The Coolgardie Botanical District. The Coolgardie botanical district marks the transition from the South-West Province to the Eremaean Province, from the Eucalyptus zone to the Acacia zone. In this district a high degree of variability occurs within *Eucalyptus* and *Acacia*. It is thought that this variability may have been due to climatic oscillations known to have occurred since the Pleistocene period, thus making many of the 'species' of recent origin. The vegetation is a mosaic of woodland and shrubland formations. Woodland formations include *E. salmonophloia*, *E. transcontinentalis*-*E. flocktoniae*, *E. torquata*-*E. lesouefii*, *E. dundasii*-*E. longicornis*, *E. brockwayi* and *Acacia aneura* alliances. Shrubland formations include *Grevillea eriostachya*-*G. didymobotrya*-*G. excelsior*, *Eucalyptus foecunda*, *E. eremophila* and other mallee or shrub eucalypts, *Acacia* spp.-*Casuarina* spp.-*Melaleuca* spp. and *Acacia aneura* alliances.

The South-West Province

The South-West Province, which receives its rainfall in winter and has a warm to cool temperate climate, has a high degree of endemism in its flora. The degree of endemism is most powerfully expressed in the cusps of its triangular-crescentic area particularly in the high shrubland and heath formations found to the north of the Hill River and to the east of the Fitzgerald River. The shrubland and heath formations in the South-West Province, apart from certain communities dominated by *Eucalyptus* and *Acacia*, are known as Kwongan. Large areas of this province have been altered greatly by man and contain a high proportion of the naturalised alien species recorded in the State.

The Darling Botanical District. The Darling botanical district consists of four sub-districts. The Warren subdistrict, which occupies the extreme south-western corner of Western Australia, has an annual rainfall in excess of 1,200 mm. The main vegetation formations are the high open forest, on granite soils represented by *E. diversicolor* alliance; open forest on lateritic soils represented by *E. marginata*-*E. calophylla* alliance; low forest and scrub of *Agonis flexuosa* on extensive coastal dunes; also on sand dunes, heaths, with *Jacksonia horrida*-*Acacia decipiens*; and sedgeland of *Evan-*

dra aristata-*Anarthria* spp. in waterlogged areas.

The *Menzies* subdistrict marks the transition from the Warren subdistrict to the Dale subdistrict.

In the *Drummond* subdistrict the narrow strip of Recent or Pleistocene sand dunes carry scrub or low forests of *Agonis flexuosa* alliance at the southern edge, with *Acacia rostellifera*-*A. cyclops*-*A. cochlearis* alliance and sand dune complex over most of its length. Inland and parallel to the coastal dune system is a narrow belt of coastal limestone hills, the natural habitat of *E. gomphocephala* woodland alliance. The greater part of the Perth basin is mantled with aeolian sands. The northern sector carries a low forest formation of *Banksia menziesii*-*B. attenuata*-*Allocasuarina fraseriana*-*E. tottiana* alliance, with a heath understorey, and smaller areas of *B. prionotes* alliance; the southern part is dominated by a *E. marginata*-*E. calophylla* open forest or woodland alliance, with a heath understorey, and smaller areas of *Banksia* low forest. Poorly drained swampy areas carry *Casuarina obesa* low forest alliance. Swamp and fen formations are made up of complex communities of sedgeland. Watercourses in the district are fringed by a *E. rudis*-*Melaleuca* spp. alliance.

The *Dale* subdistrict occupies the laterite capped plateau dissected by young streams to form steep-sided valleys. An open forest formation of *E. marginata*-*E. calophylla* alliance characterises the lateritic erosional and deep depositional surfaces, with *E. wandoo* alliance restricted to the heavier pediment soils.

The Irwin Botanical District. The Irwin botanical district, for the most part, overlies sedimentary rocks from Silurian to Quaternary age, with smaller areas of Precambrian metamorphics. At the northern extremity, the Irwin district consists of red and yellow sands underlain by Mesozoic sediments. High shrubland formations are made up of mixed high shrubland with a heath understorey, with mainly Proteaceous and Myrtaceous elements, *Acacia* spp. *Allocasuarina acutivalvis* and *Melaleuca* spp. and *Hakea* spp. scrub alliances. Low woodlands of *Banksia menziesii*-*B. attenuata*, *B. ashbyi*-*B. sceptrum*, *B. prionotes* and *Actinostrobos arenarius* occur on deep sands. Heath and

low heath formations of Proteaceae, Myrtaceae, and Leguminosae occur in areas where the sand is shallow or where a lateritic crust is present.

The vegetation of the coastal dune system is an extension of the Darling district. The limestone hills in the Irwin district carry low woodlands of *E. erythrocorys*. Poorly drained areas and small lakes carry or are fringed by *Casuarina obesa* and *E. rudis*-*Melaleuca* spp. alliances.

The central to southern portions of the Irwin district are characterised by the so-called 'sand plains'. These carry low woodlands of *Banksia menziesii*-*B. attenuata*-*E. tottiana* and *B. prionotes* alliances particularly on the deeper sands. *E. lane-poolei* (Salmonbark Wandoo) and *E. accedens* (Powderbark Wandoo) are of local significance, on heavy clay soils. In areas of deep dissection, the valleys carry woodlands of *E. wandoo* and *E. calophylla* alliances. Heath and low heath formations cover most of the elevated regions. Proteaceae, Myrtaceae and Leguminosae are dominant components, while on laterite hills *Xanthorrhoea reflexa* and *Dryandra* spp. become very conspicuous. High shrubland communities with *Grevillea eriostachya*-*G. didymobotrya*-*G. eriostachya*, *Lambertia multiflora* (Native Honeysuckle) and *Actinostrobos arenarius* alliances are also significant in the sandplain region.

The Avon Botanical District. The Avon botanical district, which covers most of the so-called wheat belt, is now for the most part cleared of native vegetation for farming.

On the eastern edge of the Darling district, on the low hilly to hilly terrain, with hard acidic yellow mottled soils, the pediments of early erosional cycles, the woodland formation consists of *E. wandoo* alliance. *E. marginata*-*E. calophylla* alliance occurs on soils which tend more to ironstone gravels with a sandy matrix. *E. wandoo* alliance is associated with *E. accedens*, and with *E. astringens* which commonly occur on lateritic breakaways. In the southern portion *E. gardneri* (Blue Mallet) and *E. falcata* (Silver Mallet) are more commonly seen on the breakaways, while *E. cornuta* woodland alliance replaces the *E. wandoo* woodland alliance. *E. wandoo* woodland has a very open low shrub layer.

On the hard neutral red soils of the river valley systems, which represent further erosional cycles, the woodland formation is represented by the *E. loxophleba* alliance, with *Acacia acuminata* as its main associate. *A. acuminata* tends to merge with the *E. wandoo* alliance, particularly as the soils become sandy or gritty. In the southern portion *E. occidentalis* alliance replaces the *E. loxophleba* alliance. *E. occidentalis* woodlands occur also on the clay soils of swamps or seasonal shallow lakes.

Extensive areas of *E. salmonophloia* woodland alliance are found in the hard alkaline yellow soils further to the east, on valley plains and terraces. *E. salmonophloia* woodland has an open mixed low shrub understorey with *Maireana* and *Atriplex* dominating in more saline soils. Other trees associated with this alliance are *E. salubris* (Gimlet), *E. longicornis* (Red Morrel) and *E. melanoxydon* (Black Morrel).

Salt lakes, remnants of once extensive river systems, carry *Casuarina obesa* and *Melaleuca* spp. low woodland alliances on the fringes with low shrubland formations of *Halosarcia* spp. alliance in the old watercourse. *E. sargentii* (Salt River Gum) and *E. kondininensis* (Kondinin Blackbutt) grow on saline soils.

The Eyre Botanical District. The Eyre botanical district lies at the edge of the Archaean Shield where it abuts into the Proterozoic metamorphics of the Albany-Esperance block. The latter consists largely of sediments of middle and late Eocene age, at one time mantled by a lateritic crust, which is represented in the present landscape by narrow ironstone gravel ridges and erosional scarps along the northern edge.

The Stirling and Mount Barren Ranges which rise abruptly out of an otherwise predominantly undulating landscape are composed of hard Proterozoic metasedimentary rocks. The ranges carry Kwongan of closed heath and scrub formations of mixed Myrtaceae, Proteaceae, Leguminosae and Epacridaceae alliance. Woodlands of *E. marginata*-*E. calophylla*, *E. wandoo* and *E. cornuta* occur on the lower slopes and valleys of the Stirling Range.

Over a large area of the Eyre district, the vegetation is made up of Kwongan of high shrubland formations with shrub or mallee

eucalypts dominating. *E. tetragona*, *E. redunca*-*E. uncinata*, *E. gardneri*-*E. nutans* and *E. eremophila*-*E. oleosa* alliances form a mosaic over the area, the former on the undulating upper slopes and rises nearer the coast. Patches of mixed heath and low heath of Proteaceae, Myrtaceae and Leguminosae are present. The heath vegetation merges into and forms the understorey of the high shrubland communities. To the east *E. tetragona* alliance gives way to *E. tetragona*, while on the sandy soils *Banksia speciosa*-*lambertia inermis* and *Nuytsia floribunda* become dominant.

Woodland formations of *E. occidentalis*, *E. loxophleba* and *E. salmonophloia* alliances occur along drainage lines and loamy slopes and flats. Low forests of *E. platypus*-*E. gardneri*-*E. falcata* alliance occur locally on scarp slopes.

The littoral fringe of the coastal plain is made up of a chain of granite bosses with drift sand between them. *Acacia rostellifera*-*A. cyclops*-*A. cochlearis* and *Agonis flexuosa* scrub alliances are present with the sand dune and granite lithic complexes. *Banksia baxteri* and *B. attenuata*, as well as *Lambertia inermis* (Chittick), are dominant on the drift sand, inland, with *E. marginata* and *E. cornuta*, the former found to the west, the latter restricted to interdunal flats.

The Roe Botanical District. The Roe botanical district contains a number of plant communities found in the adjacent Eyre, Avon and Coolgardie districts. On residual sandplains there are extensive areas of mixed heath.

REFERENCES

- Aplin, T.E.H. The Flora in *Environment and Science* (Ed. Brian J. O'Brien). University of Western Australia Press, Nedlands, 1979.
- Aston, H.I. *Acquatic Plants of Australia*. Melbourne University Press, Carlton, 1973.
- Beard, J.S. (ed.). *West Australian Plants*. 2nd ed. Society for Growing Australian Plants, Sydney, 1970.
- Beard, J.S. *Vegetation Survey of Western Australia 1 : 250,000 series*. Vegmap Publications, Sydney, 1969-1980.

- Beard, J.S. *Vegetation Survey of Western Australia 1 : 1,000,000 series*. University of Western Australia Press, Nedlands, 1974-1981.
- Beard, J.S. *Phytogeographic Regions in Western Landscapes* (Ed. J. Gentili). University of Western Australia Press, Nedlands, 1979.
- Bentham, G. *Flora Australiensis*. Reeve, London, 1863-78.
- Blackall, W.E. and Grieve, B.J. *How to Know Western Australian Wildflowers* Parts 1-3. University of Western Australia Press, Nedlands, 1956-65. 2nd ed. Parts 3-4 1980-82.
- Burbidge, N.T. *Dictionary of Australian Plant Genera*. Angus and Robertson Pty Ltd, Sydney, 1963.
- Chippendale, G.M. *Eucalypts of the Western Australian Goldfields (and the adjacent wheatbelt)*. Australian Government Publishing Service, Canberra, 1973.
- Commonwealth Scientific and Industrial Research Organization. *Land Research Series*, Nos 4, 7, 9, 28, 1960-70.
- Erickson, R. *Triggerplants*. Paterson Brokensha, Perth, 1958.
- Erickson, R. *Orchids of the West*. 2nd ed. Paterson Brokensha, Perth, 1965.
- Erickson, R. *Plants of Prey in Australia*. Lamb Paterson, Perth, 1968.
- Erickson, R., George, A.S., Marchant, N.G. and Morcombe, M.K. *Flowers and Plants of Western Australia*. Reed, Sydney, 1973.
- Gardner, C.A. 'The Vegetation of Western Australia'. Presidential Address, 1942. *J. Roy. Soc. W. Aust.*, Vol. 28, 1949, pp.11-87.
- Gardner, C.A. 'Trees of Western Australia'. Reprinted from *J. Agric. W. Aust.* 1952-66.
- Gardner, C.A. 'Gramineae'. *Flora of Western Australia*, Vol. 1, pt 1, Government Printer, Perth, 1952.
- Gardner, C.A. *Wildflowers of Western Australia*. 11th ed. West Australian Newspapers Ltd, Perth, 1973.
- George, A.S. (ed.). *Flora of Australia*. Vols 1—Australian Government Publishing Service, Canberra, 1981 — continuing.
- Green, J.W. *Census of the Vascular Plants of Western Australia*. 2nd ed. Western Australian Herbarium, South Perth, 1985.
- Jessop, J.P. and Toelken, H.R. *Flora of South Australia*. 4th ed. Government Printer, Adelaide, 1986.
- Lander, N.L. *Sources of information on the vegetation and flora of Western Australia*. Western Australian Herbarium, South Perth, 2nd ed. revised K.F. Kenneally, 1986.
- Leigh, J., Briggs, J. and Hartley, W. *Rare or Threatened Plants*. Australian National Parks and Wildlife Service, Canberra City, 1981.
- Marchant, N.G. and others. *Flora of the Perth Region*, Parts 1 and 2. Western Australian Herbarium, Western Australia, 1987.
- Morcombe, M.K. *Australia's Western Wildflowers*. Landfall, Perth, 1968.
- Nuytsia. Bulletin of the Western Australian Herbarium, Western Australian Department of Agriculture, South Perth, 1970 - continuing.
- Pate, J.S. and Beard, J.S. (ed.) *Kwongan, Plant Life of the Sandplain*. University of Western Australia Press, Nedlands, 1984.
- Ride, W.D.L. and others. *National Parks and Nature Reserves in Western Australia*. Government Printer, Perth, 1966.
- Seddon, G. *Sense of Place. A Response to an Environment: The Swan Coastal Plain, Western Australia*. University of Western Australia Press, Nedlands, 1972.
- Smith, G.G. *A Guide to the Coastal Flora of South-Western Australia*. Handbook No. 10 of the Western Australian Naturalists' Club. Perth, 1973.
- Specht, R.L. 'Vegetation' chapter in *The Australian Environment*. 4th ed. C.S.I.R.O. — Melbourne University Press, Melbourne, 1970.
- Specht, R.L., Roe, Ethel M. and Boughton, Valerie H. 'Conservation of Major Plant Communities in Australia and Papua New Guinea'. *Aust. J. Bot. Supp. Series*, Supp. No. 7, 1974.
- Vegetation Survey of Western Australia series*. Western Australian Department of Agriculture, South Perth, 1972.

The Fauna of Western Australia

(Contributed by the Western Australian Museum)

EXTINCT FAUNAS ⁽¹⁾

Earth's oldest recorded organic remains occur in Western Australia. Stromatolites discovered near Marble Bar are about 3,500 million years old. They are dome-shaped structures in which sediment has been trapped by single-celled Cyanobacteria. Stromatolites have been found throughout sediments of Precambrian age; living survivors also occur in Western Australia, the best known being in Shark Bay.

Invertebrate marine life in the Cambrian (570-500 million years ago) is revealed in rocks in the Ord River district, crowded with trilobites (*Redlichia*, *Xystridura*), brachiopods (*Wimanella*, *Billingsella*) and *Biconulites*.

The Ordovician (500-440 million years) saw a substantial thickness of marine deposition in the West Kimberley, with abundant fossil nautiloids (e.g. *Kyminoceras*) and other molluscs, graptolites, trilobites and brachiopods (*Spanodonta*).

The Silurian (440-395 million years) seems to have passed with little sedimentation in Western Australia. In the lower Murchison district however, sandy deltaic deposit formed around the mouth of an extensive river system. This sandstone, now incised by the gorge of the Murchison River, has preserved tracks of a range of marine animals including those of large, scorpion-like predators known as eurypterids.

Seas of the Devonian (395-345 million years) abounded in early forms of fish. Limestones of this age in the West Kimberley have yielded exquisitely preserved fossils, including primitive armoured fishes (Placoderms), a sea-living lungfish (Dipnoan), Rhipidistians, Acanthodians and other early bony fishes. Because of their fine preservation, these fossils have formed the basis of important research into early fish evolution. Extensive shallow-water Devonian limestone reefs around the south-western part of the

central Kimberley Block contain abundant marine faunas, including stromatoporoids (*Amphipora*, *Actinostroma*), corals, (*Hexagonaria*, *Thamnopora*), brachiopods (*Stringocephalus*, *Ladjia*, *Schuchertella*), nautiloids (*Beloceras*), goniatites (*Manticoceras*, *Platyclymeria*), other molluscs, bryozoans and trilobites. The oldest known vascular plants from Western Australia occur only rarely in Devonian sediments of the East Kimberley (the lycopod *Leptophloeum*) and of the Carnarvon area (a lepidodendroid).

The Carboniferous (345-280 million years) saw deposition confined to parts of the East and West Kimberley and Carnarvon areas. The marine formations contain rich invertebrate faunas, including corals (*Syringopora*) brachiopods (*Camarotoechia*, *Cleiothyridina*, *Unispirifer*), trilobites, molluscs and bryozoans.

Permian deposits (280-225 million years) cover extensive areas in Western Australia. Principal occurrences are in the West Kimberley, Carnarvon and Irwin River districts. Marine sediments contain diverse invertebrate faunas, including crinoids (*Calceolispongia*, *Jimbacrinus*), brachiopods (*Neospirifera*, *Linoproductus*, *Aulosteges*, *Strophalosia*), goniatites (Juresanites), bivalves (*Deltopecten*, *Schizodus*), gastropods (*Ptychomphalina*, *Bellerophon*), corals (*Pleurophyllum*, *Euriphyllum*) and the rare trilobite *Ditomopyge*. A shark, *Helicoprion*, is known from the Carnarvon district. Permian coal measures occur in the Collie and Irwin districts and contain a flora which includes *Glossopteris*, *Gangamopteris* and *Noeggerathiopsis*.

Rocks of the Triassic (225-194 million years) are exposed only in a few small areas of the State. A marine deposit in the Erskine Range, West Kimberley, contains large amphibians (*Deltasaurus*, *Blinasaurus*), fish including a dipnoan (*Ceratodus*) and

(1) Contributed by K.J. McNamara and G.W. Kendrick.

invertebrates (*Lingula*). A similar deposit in the Geraldton district has yielded remains of *Deltasaurus*, ammonites (*Ophiceras*) and other invertebrates, including molluscs and brachiopods. Terrestrial deposits in the West Kimberley contain remains of the 'Seed Fern' *Dicroidium*, the bennettitalean *Otozomites* and other plants.

Jurassic (194-135 million years) marine sediments in the Geraldton area contain a rich, well-preserved mollusc fauna, notably bivalves (*Trigonia*, *Cucullaea*, *Oxytoma*, *As-tarte*), and ammonites (*Fontannesia*, *Otoites*, *Pseudotoites*), a large nautiloid, brachiopods and rare echinoids. Slightly younger marine faunas in the West Kimberley contain the bivalves *Inoceramus*, *Buchia* and *Mal-ayomaorica*, the ammonite *Kossmatia* and belemnites.

Australian Jurassic land vegetation included elements with extensive global distributions. Plants of this period recorded from the West Kimberley, include the Bennettites *Taeniop-teris*, *Otozamites* and *Ptilophyllum*, the conifers *Brachyphyllum* and *Elatocladus* and *Ginkgoites*, related to the living *Ginkgo*.

Widespread deepwater radiolarites of the Cretaceous Period (135-65 million years) in the Carnarvon hinterland contain the large ammonites *Tropaeum*, *Australiceras* and numerous belemnites. Chalk occurs sporadically from near Exmouth Gulf southwards to near Perth and contains rich faunas of bivalves (*Inoceramus*, oysters etc.), brachiopods (*Inopinatarcula*, *Magadina*), crinoids (*Marsupites*, *Uintacrinus*) and occasional pachydiscoid ammonites. Greensands in the Gingin-Dandaragan district have yielded ichthyosaur, plesiosaur and mosasaur remains, as well as shark teeth. A Late Cretaceous deposit near Exmouth Gulf is notable for its prolific ammonite fauna which lived close to the time of extinction of this group of cephalopod molluscs. Western Australia's only known dinosaur, a theropod, *Megalosauropus broomensis*, is known only from footprints preserved in Lower Cretaceous sandstone at Broome. Land vegetation (including *Cladophlebis*, *Otozamites*) associated with this and other Lower Cretaceous deposits show affinities with archaic Jurassic forms.

The onset of the Tertiary (65.0-1.6 million years) brought major changes to marine faunas, with the decline and disappearance

of a number of long-standing Cretaceous groups and their gradual replacement by more modern forms. Marine limestones and greensands of Paleocene (65-54 million years) age form an extensive surface outcrop in the Exmouth district and are notable for well-preserved faunas of echinoids (*Giraliaster*, *Schizaster*), brachiopods (*Tegulorhynchia*) and bryozoans; the nautiloids *Aturoidea*, *Deltoiconautilus* and *Teichertia* are also represented.

Eocene (55-40 million years) marine deposits in the Carnarvon hinterland contain well-preserved faunas, notably corals and molluscs including the nautiloid *Aturia*. Plant remains include familiar modern genera, such as *Banksia*, *Casuarina* and forms related to *Araucaria*. *Banksia* cones from this area provide the earliest unequivocal record for the genus in Australia. Eocene deposits along the south coast contain a great diversity of fossil remains, both marine and non-marine. Marine groups present include many species of sponges, echinoids and molluscs, including the nautiloids *Aturia*, *Cimomia* and *Teichertia*. Rich assemblages of fossil leaves, wood, pollen, spores and occasional fruiting bodies are known from Eocene and other early Tertiary deposits in southern Western Australia. Most of this diverse flora remains to be identified; however, the presence of tree ferns and other ferns such as *Gleichenia*, the conifers *Araucaria*, *Agathis* and *Dacrydium*, palms such as *Livistona*, the Antarctic Beech, *Nothofagus*, mangroves including rhizophoraceans and genera of humid-tropical affinity, such as *Ficus*, *Terminalia*, *Bombax* and *Anacolosa* indicate vegetation consistent with a humid temperate rainforest environment.

In the Miocene Epoch (23-5 million years), extensive deposits of marine limestone were laid down in the Carnarvon and Nullarbor districts. These contain rich fossil assemblages, notably molluscs and echinoids. Affinities of the northern fauna lie strongly with the tropical Indo-Pacific; those of the Nullarbor area lie mainly with south-eastern Australia. Toward the end of the period, a marked intensification of global cooling was observed, accompanied by a substantial fall in sea level and in Australia, a shift toward continental aridity.

Sea levels appear to have remained lower than at present around Western Australia during most of Pliocene time (5.0-1.6 million years). Faunal remains from this period are known from deposits on the Roe Plains of the southern Nullarbor and from the subsurface near Perth. The coastline near Perth lay close to the foot of the Darling scarp, the Swan Coastal Plain being, for a time, wholly submerged.

During Quaternary time (the last 1.6 million years) many caves formed and have preserved the fossil remains of a vertebrate fauna of much greater diversity than that recorded today. Included are species of kangaroo (*Macropus*) larger than any living kangaroo, as well as other large macropods including *Sthenurus* and *Protemnodon*; the large diprotodontid *Zygomaturus*; the 'marsupial lion', *Thylacoleo*; a koala, *Phascolarctos*, a wombat *Vombatus*; a large echidna, *Zaglossus*; a giant flightless bird of the family Dromornithidae and a large boid snake, *Wonambi*. When these elements became extinct is unknown, but it appears to have been more than 40,000 years ago. The Thylacine (*Thylacinus*) and Tasmanian Devil (*Sarcophilus*) became totally extinct within Western Australia more recently, the Thylacine disappearing about 3,500 year ago. The Dingo appeared first in relatively recent times no more than 4,000 years ago, co-existing only for a brief period with its marsupial counterpart, the Thylacine.

CONTEMPORARY FAUNAS

Origins and Distributions ⁽²⁾

Terrestrial. The origins of the Australian fauna can be explained by the breakup of the southern hemisphere supercontinent, Gondwana, in the Cretaceous and the northward drift of Australia during the Tertiary to close the 4,000 kilometre gap with South-East Asia. Consequently the contemporary fauna comprises an ancient Gondwanic element with affinities with faunas of the other southern continents, and a more recent post-Gondwanic northern continental element. Representatives of the latter have reached Australia at different times by flying or rafting across water barriers of varying width. Among the earliest to arrive

were successful rafters, such as lizards and rodents and good flyers such as certain birds and bats. Others (including humans) less able to cross the barriers arrived later by 'island-hopping' via the unstable arc of islands linking South-East Asia at times when sea levels were lower and water barriers narrower. There are thought to have been two main routes of invasion to Australia as a whole: from the Malaysian Archipelago (or Philippines) via Celebes to New Guinea and Cape York Peninsula, and via the Sunda Arc to the Kimberley and Arnhemland.

The present distribution of the modern Western Australian fauna reflects not only past geological and climatic events, particularly those of the Quaternary, but also short term climatic oscillations. The broad distribution patterns of most living terrestrial animals can generally be related to today's major climatic zones which give rise to three major faunal divisions: a northern tropical fauna adapted to conditions of reliable monsoonal summer rain and dry winters characteristic of the Kimberley; a temperate fauna adapted to Mediterranean-type conditions with reliable winter rainfall and dry summers characteristic of the south-west and, between them, a fauna adapted to arid conditions with irregular and variable rainfall that prevail over the remainder of the State. These broad faunal divisions do not necessarily reflect origins and both Gondwanic and post-Gondwanic elements may be present in each. However, particularly in some of the more mobile groups, such as birds and bats, the Kimberley has stronger South-East Asian representation than the others. Additionally, a number of interesting Gondwanic relics are now confined to the south-west, e.g. certain genera of legless lizards (Pygopodidae), an onychophoran (*Occiperipatoides*) and the Salamander Fish (*Lepidogalaxias*).

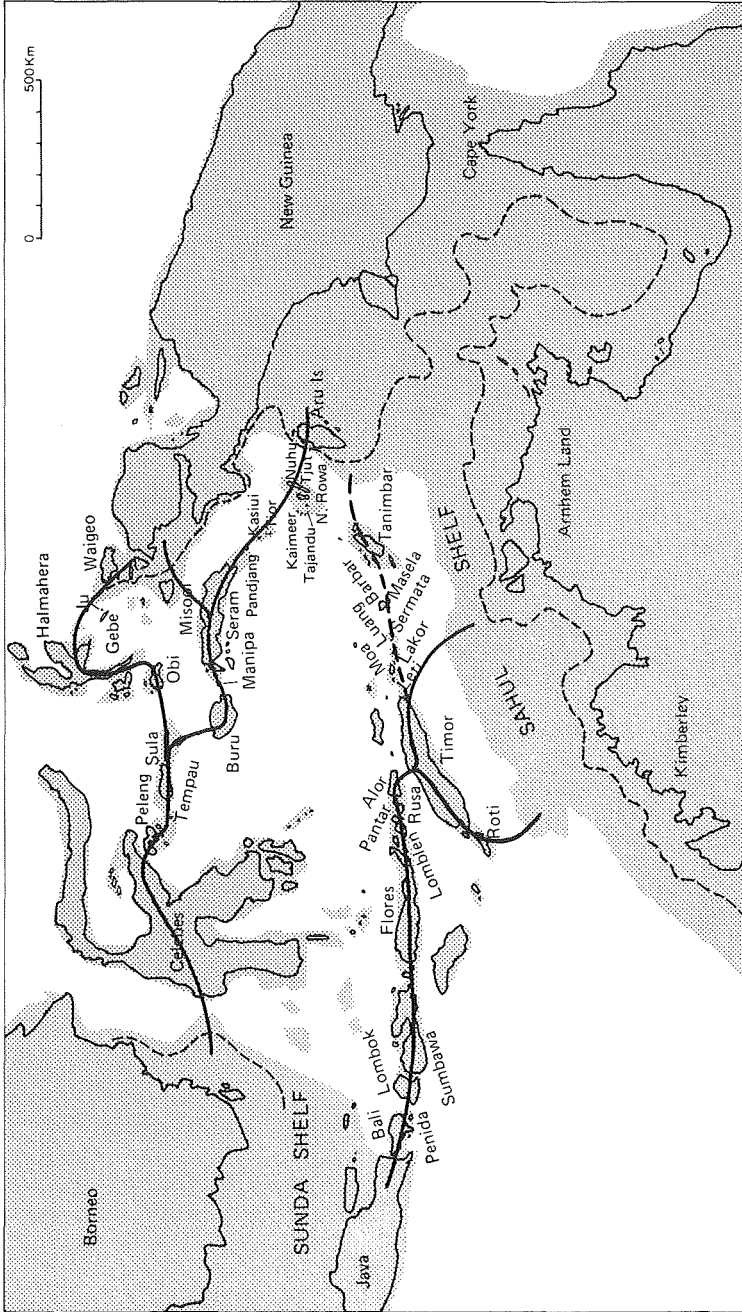
Elevation has little influence on broad faunal distributions as Western Australia is generally of low relief, averaging only about 400m above sea level with a maximum of 1,200m.

The distribution of some terrestrial species, particularly medium-sized marsupials, has been substantially modified by recent direct and indirect influence of European man (e.g.

(2) Contributed by P.F. Berry.

DIAGRAM 4.1

FAUNAL MIGRATION ROUTES TO AUSTRALIA



Exposed land areas at the lowest sea-level of approximately minus 120 m (stippled) and at the average sea level over the last 120,000 years of minus 50 m (dotted line). Postulated faunal migration routes are shown as solid lines (redrawn from Birdsall, 1977).

land clearing and introduction of alien animals), usually resulting in marked contraction of former distributional ranges, but a few distributions, such as that of the Crested Pigeon, have expanded. Near shore islands, cut off by rising sea levels, such as Barrow, Bernier, the Houtman Abrolhos and the Archipelago of the Recherche, are important refuges for a number of terrestrial animals that have recently disappeared from the mainland or have contracting distributions. On some islands, forms have evolved that are distinct from their mainland counterparts.

Inland Waters. The inland waters of Western Australia may be divided into rivers and inland drainage systems. The flow regimes of the rivers reflect the climatic zones of the State. Rivers of the northern zone flow during the summer wet season. During the winter dry season flow is dependant on groundwater and may cease altogether, leaving only pools.

The fauna is rich and diverse, examples being the freshwater crocodile *Crocodylus johnstoni*, large freshwater prawns or Cherabun (*Macrobrachium*) and archer fishes (Taxotidae). Rivers of the arid zone from the De Grey to the Murchison are subject to periodic flooding usually associated with cyclones, but become reduced to isolated pools during drought. The faunal assemblages of the larger rivers are impoverished in comparison with the rich assemblages of the Kimberley and some species represent outliers of these. Flow of most permanent rivers and streams of the south-western winter rainfall zone slows down substantially in summer and some are reduced to chains of pools. Increased salinity caused by agricultural clearing, and building of dams is rapidly altering much of the riverine ecosystem in this zone. The fauna of the south-western rivers and streams is of particular interest for its Gondwanic element, examples of which are native minnows (Galaxiidae), freshwater crayfish (Parastacidae) and a freshwater mussel (*Westralunio*).

The inland drainage systems can be divided into fresh-water 'gnamma-holes' usually in granite outcrops, claypans (including man-made dams), swamps, soaks and lakes; and saline lakes. Gnamma-holes, claypans and soaks of the arid zone are characterised by

an ephemeral fauna, mainly of brachiopod crustacea. Many birds and mammals dependent of free water must move away if they dry up. Man-made dams have increased the availability of water and the abundance and distributions of certain animals in this zone have changed. Permanent lakes, swamps and soaks along the south-western coast are important refuges for water birds. The saline lakes of the inland and south-west support an interesting and highly adapted ephemeral fauna. Conspicuous when water is present are brine shrimps (*Artemia* and *Parartemia*), which at times build up to high population densities and attract large numbers of water birds, many of which breed there.

Coastal Waters. The coastal marine fauna of the north coast is distinct from that of the south coast although a few species do occur around the entire coastline. The northern fauna is representative of the widespread tropical Indo-West-Pacific fauna. It is the product of the continuous tropical conditions experienced on the north coast since the beginning of the Tertiary owing to Australia's northward drift. The southern fauna is representative of a temperate element largely restricted to the Australian south coast. The south coast has experienced less stable environmental conditions than the north since the break-up of Gondwana, including circulation changes (development of the west wind drift) and marked temperature fluctuations owing to glaciations and changes in position of the sub-tropical convergence. Consequently, the origins of the present fauna are complex, sometimes involving renewed contact between sister species which had evolved on the west and east coasts. Some species of the northern and southern faunas overlap on the west coast, with the distribution of tropical species being extended well south by the southward flow of the Leeuwin current in winter. This overlap region of the west coast is characterised by a number of endemic species. Of these, two commercially important examples are the Western Rock Lobster *Panulirus cygnus* and the Western Jewfish *Glaucosoma hebraicum*.

Mammals ⁽³⁾

The modern Australian mammal fauna comprises approximately equal numbers of marsupials (pouched mammals), and eutherians (true placental mammals), and two species of monotremes (egg-laying mammals).

Western Australia, with about one-third of the area of the continent, has 55 per cent of all Australian species of mammals. This fauna comprises 166 native and 19 introduced (including the Dingo) species, including representatives of all modern families except those of the Platypus, Tasmanian Tiger, Koala and rhinolophid bats. Excluding exotics and the single monotreme, the Echidna, the terrestrial assemblage comprises 53 per cent marsupials, 21 per cent rodents and 26 per cent bats. This is a close reflection of the proportion of these broad groups on the continent as a whole.

Because of the extensive coastline encompassing both tropical and temperate areas, Western Australian waters have representatives of most of the Australian aquatic mammals, including four seal, seventeen whale and fifteen killer whale and dolphin species, as well as a particularly large population of Dugong (*Dugon dugon*) at Shark Bay.

Nineteenth century American and other whalers took Sperm Whales *Physeter macrocephalus*, Southern Right Whales *Eubalaena australis* and Humpback Whales *Megaptera novaengliae*; local bay whalers also took the latter two species, while in the 20th century Humpbacks and Sperm Whales were hunted from shore stations. Humpbacks were so seriously overfished that the industry ceased in 1963 but there has been some recovery in numbers recently. Southern Right Whales are also being seen more frequently. Sperm whaling ceased in 1978. All cetaceans now receive special protection under the *Commonwealth Whale Protection Act 1980*.

The State's mammal fauna can be grouped into broad divisions related to climatic zones mentioned on page 59. The south-western zone is particularly rich in native terrestrial mammals, with sixty-three species recorded since European settlement. Endemics comprise the Dibbler, *Parantechinus apicalis*; White-tailed Dunnart, *Sminthopsis granulipes*; Western Ringtail Possum,

Pseudocheirus occidentalis; Honey Possum, *Tarsipes rostratus*; Broad-faced Potoroo, *Potorous platyops*; Banded Hare-wallaby, *Lagostrophus fasciatus*; Quokka, *Setonix brachyurus*; Western Brush Wallaby, *Macropus irma*; the marsupial mice, *Sminthopsis gilberti* and *S. griseoventer*; Ashy Grey Mouse, *Pseudomys albocinereus*; and the Western Mouse, *Pseudomys occidentalis*.

The south-western zone is noticeably richer in macropodids than the other broad regions. However, many south-western species in the kangaroo family are now extinct there and persist only on the continental islands off the coast. Those no longer in the south-western zone are: Long-nosed Potoroo, *Potorous tridactylus*; Broad-faced Potoroo, *P. platyops* (extinct); Burrowing Bettong, *Bettongia lesueur*; Banded Hare-wallaby, *Lagostrophus fasciatus*; Rufous Hare-wallaby, *Lagorchestes hirsutus* and Crescent Nailtail Wallaby, *Onychogalea lunata* (extinct). Compared to the northern zone, the south-western zone is poor in bat species.

The northern zone of reliable summer rainfall has a relatively rich mammal assemblage of sixty-five species, particularly of the small vespertilionid and hipposiderid bats. This assemblage is more distinctive than those of the other regions, containing groups not found elsewhere in the State (hipposiderid bats; Blossom-bat, *Macroglossus*; mosaic-tailed rats, *Melomys*; tree rats *Mesembriomys*; Rabbit-eared Rat, *Conilurus*; Scaly-tailed Possum, *Wyulda* and the little Rock-wallaby, *Peradorcas*) but excluding other genera that are widely represented elsewhere (Stick-nest rats, *Leporillus*; hopping mice *Notomys*; Kultarr, *Antechinomys*; ningauis, *Ningau* and long-nosed bandicoots, *Perameles*). Endemic to the Kimberley are: *Antechinus* sp. 'ningbing'; Scaly-tailed Possum, *Wyulda squamicaudata*; Warabi, *Petrogale burbridgei* and Yellow-lipped Eptesicus, *Eptesicus douglasorum*.

The south-western part of the Kimberley, incorporating Dampier Land, has a mammal fauna that is supplemented to some extent by an intrusion of arid and semi-arid zone mammals from the Great Sandy Desert. The subhumid North Kimberley has a group of species not found elsewhere in the region,

(3) Contributed by D.J. Kitchener.

including the Little Rock-wallaby, *Peradornas concinna*; Warabi, *Petrogale burbidgei*; Northern Brown Bandicoot, *Isodon macrourus*; Common Planigale, *Planigale maculata*; Black-footed Tree Rat, *Mesembriomys gouldi*; Pygmy Long-eared Bat, *Nyctophilus walkeri* and Lesser Wart-nosed Horseshoe Bat, *Hipposideros stenotis*. However, the species richness of this area declines with rainfall gradients and major geomorphological changes across the region. The east Kimberley has a relatively depauperate mammal assemblage with few drier-country species. This reflects the combined influence of the drier climate and its geomorphological similarities to the north Kimberley.

The arid zone includes the deserts, Pilbara, North West Cape, Murchison and Gascoyne areas. Over much of the region rain generally falls in summer, although the southern deserts and western part of the other areas receive most of their effective rain in winter. Mosaics of desert dune, sandplains and alluvial plain environments are found throughout the region.

The deserts, contrary to popular belief, are not markedly poor in species of mammals. Fifty-two species of native mammals are recorded from there. Although none is confined to the desert areas, a number are restricted to desert substrates (Hairy-footed Dunnart, *Sminthopsis hirtipes*; Lesser Hairy-footed Dunnart, *S. youngsoni*; Long-tailed Dunnart, *S. longicaudata*; Spinifex Hopping Mouse, *Notomys alexis*; Desert Bandicoot, *Perameles eremiana* and Desert Mouse, *Pseudomys desertor*). Dasyurids, particularly the species *Sminthopsis* and native rodents of the genus *Pseudomys*, are well represented (both genera by six species). However, the other rodent genera are poorly represented there.

Slightly fewer than half of the species found in the deserts have restricted arid or semi-arid distributions; many are widely distributed species including a few tropical intruders (Northern Brush-tailed Possum, *Trichosurus arnhemensis*; Northern Nailtail Wallaby, *Onychogalea unguifera* and Northern Mastiff-bat, *Chaerophon jobensis*) and those from the temperate south-western zone referred to earlier. The relative proportions of arid and wetter tropical elements in the desert mammal fauna show gradational

changes as the deserts approach the south-western zone.

The mammal assemblage of the Pilbara, North West Cape, Gascoyne and parts of the Murchison areas shows greatest affinity with that of the deserts; as in the deserts, there are relatively fewer species (forty-nine) than either the northern or the south-western zones. Like the deserts these areas have relatively few macropodid and rodent species while dasyurids are well represented. Bats are well represented and the number of species (nineteen) in these areas is second only to the Kimberley—although as in the deserts there are relatively few vespertilionids. The Pilbara, because of its geomorphological similarities with the Kimberley, retains some elements of the Kimberley mammal fauna (Northern Quoll, *Dasyurus hallucatus*; Common Rock Rat, *Zyzomys argurus*; Orange Horseshoe Bat, *Rhinonictis aurantius*); it also has the endemic species: Pilbara Ningau, *Ningau timealeyi* and Chapman's Pseudomys, *Pseudomys chapmani*. The Little Red Antechinus, *Dasykaluta rosamondae*, once thought to be restricted to the Pilbara is now also known from the adjacent deserts.



The Pebble-mound mouse, *Pseudomys chapmani*, endemic to the Pilbara

As in eastern Australia, the group that has suffered most since European settlement comprises the medium-sized species i.e. the Desert Bandicoot, *Perameles eremiana*; Pig-

footed Bandicoot, *Chaeropus ecaudatus*; Long-nosed Potoroo, *Potorous tridactylus*; Broad-faced Potoroo, *P. platyops*; Crescent Nailtail Wallaby, *Onychogalea lunata* and stick-nest rats, *Leporillus spp.* Several of the Western Australian species that are now extinct are however small rodents, namely *Notomys longicaudatus* and *N. macrotis*. The only group of mammals that has not apparently declined is the bats. In fact bats seem to have been favoured in some areas, such as the Pilbara and Murchison, by mining activity which has created new habitats in mine shafts.

Birds ⁽⁴⁾

For its size Western Australia has a small avifauna. Three hundred and eighty species breed here and approximately another 100 visit the State.

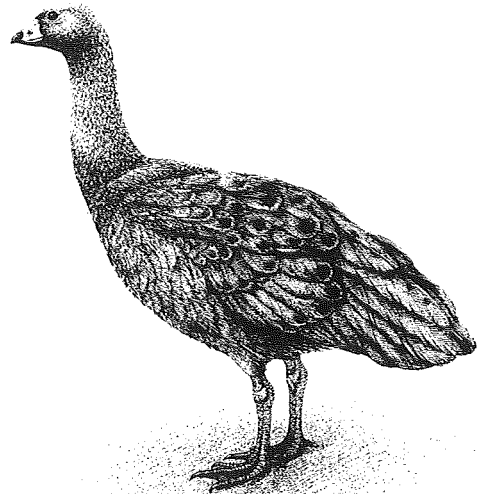
As in most groups of animals and plants, the distribution of birds in Western Australia can be related to the principal climatic zones: the northern summer-rain zone, the central arid zone and the south-western winter-rain zone.

The northern zone, a region of open woodlands with grassy understorey, is the stronghold in Western Australia of such granivorous birds as the finches and pigeons. The larger streams are lined with relatively lush forests; living in them are many species of birds, especially honeyeaters, not found further south but which extend eastwards through the Northern Territory to Queensland. In north-west Kimberley, where mean annual rainfall exceeds 1,000 millimetres, semideciduous vine forests and thickets develop on basaltic soils and other favourable sites. Confined to them are the Scrub Fowl, Red-crowned and Torres Strait Pigeons, Rufous Owl and Rainbow Pitta.

The arid zone, a region of low and unreliable rainfall, occupies the greater part of the State. North of the Tropic of Capricorn little rain is received outside summer and early autumn. Here the vegetation is predominantly a hummock grassland of spinifex (*Triodia*) that supports very few species of birds. The woodlands of river gum and cajuput fringing the north-western rivers are somewhat richer in birds, including a few

Kimberley species such as the Peaceful Dove, Pheasant Coucal, Blue-winged Kookaburra, Black-tailed Tree-creeper and Black-chinned Honeyeater.

With mean annual rainfall ranging from 250 millimetres at the mulga-eucalypt line to 1,500 millimetres in the karri forests of the deep south-west the winter-rainfall zone is much more diversified than the others. In the drier parts of the zone many of the birds inhabiting the mallee and eucalypt woodlands, e.g. the Mulga Parrot, Mallee Fowl, Southern Whiteface, Chestnut-tailed Thornbill and White-browed Babbler, also inhabit the adjacent mulga scrubs of the arid zone. Others, like the Southern Scrub-robin, Gilbert Whistler and White-eared Honeyeater, do not transgress the mulga-eucalypt line; nor do they penetrate the eucalypt forests of the wetter parts of the zone.



The Cape Barren goose, *Cereopsis nevaehollandiae grisea*, subspecies endemic to the Recherche Archipelago

Whereas the distributions of the mallee and woodland birds are continuous with, or only narrowly separated from those of eastern Australia, the birds of the wetter forests and heaths of the south-west are widely separated. In isolation some of them have evolved into distinct subspecies, e.g. the Little Wattlebird and White-cheeked

(4) Contributed by G.M. Storr.

Honeyeater, or even full species, e.g. Baudin's Cockatoo, Noisy Scrub-bird, White-breasted Robin, Elegant Fairy-wren, Western Spinebill and Red-eared Firetail. One south-western forest bird, the Red-capped Parrot, has no close relative in south-eastern Australia.

Reptiles ⁽⁵⁾

Four families of turtles, five families of lizards, seven families of snakes and one family of crocodiles are represented in Australia. Only one of them, the Cheluidae, was certainly here before the fragmentation of Gondwana. The gecko subfamily Diplodactylinae could be another example; it occurs in Australia, the Loyalty Islands, New Caledonia and New Zealand. The families Pygopodidae and Carettochelyidae are confined to Australia and New Guinea; in the absence of fossils their place of origin is unknown, as is that of marine families Cheloniidae and Dermochelyidae. All remaining families, plus the gecko subfamily Gekkoninae, probably arrived here from South-East Asia after Australia drifted northwards from Antarctica.

The northern summer-rain zone has more in common with the far north of the Northern Territory and north Queensland than with the rest of Western Australia. It is the only part of the State inhabited by colubrid snakes, wart snakes and crocodiles, and it is much richer than other regions in monitors, blind snakes and mud snakes. In the gecko family the dominant genera are *Gehyra* and *Oedura*; among dragon lizards, *Diporiphora* and *Gemmatophora*; among skinks, *Carlia*, *Ctenotus* and *Sphenomorphus*; and among elapid snakes, *Demansia* and *Denisonia*.

The fauna of the arid zone is strongly demarcated from that of the northern zone but forms a continuum with that of the south-western zone. In other words the mulga-eucalypt line is irrelevant in reptile distribution. Reptiles are generally much less sensitive to changes in the vegetation than to changes in the soil. Among arid-zone geckos the dominant genera are *Diplodactylus*, *Gehyra* and *Nephruroides*; among the dragons, *Ctenophorus* and *Tympanocryptis*; among skinks, *Ctenotus* and *Lerista*; and among elapid snakes, *Vermicella*. The seas of the Pilbara share with the Kimberley the

bulk of the State's sea snakes and marine turtles.

The arid zone is not so impoverished in reptiles as in birds and frogs. It owes this to the fact that lizards are essentially lovers of warm dry climates, and in particular to the great radiation of two genera of skinks (*Ctenotus* and *Lerista*) and a genus of geckos (*Diplodactylus*).

The south-western winter-rain zone is the most diversified part of the State. From the warm dry north to the cool humid south there is a gradual decline in the number of geckos, dragon lizards, monitors and blind snakes. The number of skinks and elapid snakes does not decline, but the composition of these families changes rapidly. For example, the dominant skink genera in the north are *Ctenotus* and *Lerista*; in the south, *Egernia*, *Morethia* and *Hemiergis*. Compared to other regions, the south-western zone is notable for its wealth of legless lizards; indeed no other part of Australia is as rich in these lizards as the coastal plains between Shark Bay and the Swan River.

Unlike the birds, the reptiles of the south-western zone have little in common with those of south-eastern Australia. The south-western zone is well represented by such northern and arid genera as *Diplodactylus*, *Ctenophorus*, *Tympanocryptis*, *Ctenotus*, *Lerista*, *Menetia*, *Morethia* and *Vermicella*. Genera shared with south-eastern Australia include *Phyllodactylus*, *Aprasia*, *Hemiergis*, *Leiopisma* and *Notechis*. Except in the far south these genera constitute only a minor part of the fauna, and one of them (*Leiopisma*) contains only two species, compared to twelve in south-eastern Australia and Tasmania.

Amphibians ⁽⁶⁾

Of the three orders of amphibians frogs alone occur in Australia, and they are represented over most of the continent by only two families, the 'tree frogs' (Hylidae) and 'ground frogs' (Leptodactylidae). Since its contact with the northern island arc, two other families have entered Australia, namely the Ranidae (a single species in North Queensland) and the Microhylidae (eight species in North Queensland, one of which

(5) Contributed by G.M. Storr.

(6) Contributed by G.M. Storr.

reaches the far north of the Northern Territory).

The frogs of Western Australia comprise two families: the Hylidae (2 genera, 25 species) and Leptodactylidae (12 genera, 43 species). In the far north (the region of good summer rains) hylid frogs slightly predominate. In the south-west (the region of good winter rains) leptodactylid frogs are overwhelmingly predominant. The intervening arid zone is understandably inhabited by many fewer species, but here too leptodactylids greatly predominate, owing to their ability to burrow and so avoid desiccation during droughts.

Fishes ⁽⁷⁾

The fish fauna of Western Australia comprises approximately 1,600 species, of which the tropical northern component is by far the largest with about 65 per cent of the total. The remaining species are divided between the southern temperate marine and freshwater environments which contain about 400 and 60 species respectively. Only about 6 per cent (95) of the marine species are endemic to Western Australia, whereas nearly 50 per cent of the freshwater fishes fall into this category. It has been conservatively estimated that another 200-300 species remain to be collected off this State, mainly from deep water.

Western Australia's temperate fish fauna consists of two major components, a cool temperate fauna inhabiting the south coast and lower west coast, and a warm temperate or subtropical fauna along the west coast. The first component is generally made up of species that are shared with other areas of southern Australia, whereas the warm temperate component contains many species endemic to Western Australia. Among the coastal reef fishes for instance, over 55 species are confined to the seas of the State, most of which have the major portion of their distributions along the west coast. The temperate fauna extends up the west coast to the region of Kalbarri, thereafter the number of cool-water species decrease sharply northwards until Coral Bay where this element disappears.

The tropical fishes tend to be widespread, occurring throughout the vast Indo-West

Pacific region. The northern tropical fauna is by far the largest comprising approximately 1,200 species. The majority are inhabitants of coral reefs, or their immediate vicinity, for example in adjacent sand flats or weed beds. The larger predators are the best known because of their edible qualities and the sport they provide for anglers. The most common fishes in this category include the groppers, coral cods, and coral trout (all members of the family Serranidae), the jacks or trevallies (Carangidae), tropical snappers or sea perches (Lutjanidae, unrelated to the popular southern snapper of the family Sparidae), sweetlips (Haemulidae), emperors (Lethrinidae) and barracuda (Sphyraenidae).

Coastal estuaries and sandflats represent another major tropical habitat for at least 100 species, including the juveniles of some species which later migrate to reefs. Mulletts (Mugilidae), threadfins (Polynemidae), ponyfishes (Leiognathidae), silver biddies (Gerriidae) and herrings (Clupeidae) are common.

The freshwater fish fauna of Australia is small by world standards, consisting of about 150 species. However, this total can be approximately doubled if species which are basically marine or estuarine, but frequently enter freshwater, are added. The main reason for Australia's impoverishment is the extremely arid climate. Nearly all its freshwater fishes were derived in relatively recent times from sea-dwelling ancestors.

The Western Australian fauna can be conveniently divided into south-western (temperate) and northern (tropical) components with little intermixing of the two except in a few streams between the Murchison and Greenough Rivers. The south-western freshwater fishes are mainly confined to the coastal belt between Esperance and Perth. Ten species are known from this region. Half of these belong to the family Galaxiidae, commonly known as native minnows. The group is represented by two genera: *Galaxias* and *Galaxiella*. The Salamanderfish, *Lepidogalaxias salmandroides* was formerly believed to belong to this group, but recent studies indicate that it is in a separate family (Lepidogalaxiidae). This small (five centimetre) fish is of special interest to biologists, some of whom believe

(7) Contributed by G.R. Allen and J.B. Hutchins

that it is a pre-Gondwanic relic showing affinities with northern hemisphere esocoid fishes. It inhabits streams and waterholes in the Pemberton area and aestivates in damp soil during drought.

The northern fauna is more diverse and comprises twelve species in the Pilbara region and about 45 species in the Kimberley Division. About half are endemic to the State. The most speciose families are the grunters (Teraponidae), catfishes (Ariidae and Plotosidae), rainbowfishes (Melanotaeniidae), hardyheads (Atherinidae), glassfishes (Ambassidae) and gudgeons (Eleotridae).

Echinoderms ⁽⁸⁾

All five groups of echinoderms — feather stars (Crinoidea) star fish (Asteroidea), brittle stars (Ophiuroidea), sea urchins (Echinoidea) and sea cucumbers (Holothuriodea) — are well represented. The majority are either tropical species or endemic species with tropical affinities.

Certain edible holothurians known as *bêche-de-mer* or *trepang* occur on the shores and reefs of the north-west. Little is known of the fishing potential for *trepang*, but the resource has been traditionally fished by boats from Indonesia. The only other echinoderm of potential economic importance is the Crown-of-thorns starfish, *Acanthaster planci* which has caused extensive damage to coral reefs in the Indo-West Pacific.

Molluscs ⁽⁹⁾

The marine molluscs number over 2,000 species. The shallow water marine molluscs may be divided into a northern tropical Indo-West Pacific fauna, a temperate southern Australian fauna and a region of overlap, characterised by the presence of west coast endemic species. The North West Cape area is the major geographical limit for tropical molluscs, with nearly one-third of species having their southern limit in that area. Two subsidiary areas of southern limits occur on the west coast at Shark Bay and the Houtman Abrolhos. The Houtman Abrolhos is the southernmost area that can be considered to have a basically tropical fauna; 72 per cent of the molluscs are tropical forms. South of the Abrolhos the

tropical species rapidly drop out; only about 3 per cent of the tropical species occur as far south as Cape Leeuwin. Most of the temperate molluscs occur along the entire south coast of Western Australia to Cape Leeuwin. About 20 per cent have their northern limit in the Cape Leeuwin - Cape Naturaliste region; only 3 per cent extend to the north coast, beyond North West Cape. Endemics comprise about 10 per cent of the west coast fauna. While some occur on the north or south coasts most endemics have at least part of their range on the west coast. Although the number of endemic species is only a small fraction of the total molluscan fauna, some species occur in large numbers and are thus ecologically important in coastal habitats.

Commercial fisheries exist for abalone, scallops, squid and pearl oysters.

The freshwater mollusc fauna is impoverished, but best developed in the Kimberley. Salt lake snails, *Coxiella*, reach their greatest diversity and abundance in the south-west. Some freshwater snails are vectors for parasites.

The land snail fauna is adapted to a wide variety of climatic conditions, ranging from moist situations to the most arid. In the Kimberley the family Camaenidae is particularly diverse. *Bothriembryon* is diverse in the south and south-west.

Corals ⁽¹⁰⁾

Approximately 335 species of corals in 71 genera have been recorded for the State. Coral growth is best developed off the tropical north with patch and platform reefs on the inner Sahul and North-West Shelves and a series of atolls along the shelf edge—Ashmore, Seringapatam and Scott Reefs and the Rowley Shoals. Along the mainland coast of the Kimberley and Pilbara and adjacent islands are fringing reefs. Best developed is the Ningaloo Reef which extends 220 km southward from North West Cape. The most southerly true coral reefs in the Indian Ocean occur at the Houtman Abrolhos off Geraldton. South of the Abrolhos the coral fauna diminishes sharply but extensive colonies of *Pocillopora damicornis* and *Montipora* grow at Rottneest Island from where 20 species have been recorded. Seven

(8) Contributed by L.M. Marsh

(9) Contributed by F.E. Wells.

(10) Contributed by L.M. Marsh

genera reach Geographe Bay and three extend to the Recherche Archipelago. The southward extension of corals along the west coast to the south coast is facilitated by the Leeuwin current which transports larvae and maintains slightly elevated water temperatures in winter.

Crustaceans ⁽¹¹⁾

The most important commercial crustacean species is the Western Rock Lobster, *Panulirus cygnus*, a west coast endemic. On the south coast, the Southern Rock Lobster, *Jasus novaehollandiae*, supports a small fishery. On the continental slope off the North West shelf five species of deep water lobsters, *Metanephrops*, are trawled, together with several species of deep water prawns.

The Swan River Prawn or School Prawn, *Metapenaeus dalli*, is netted by amateur and professional fishermen in west coast estuaries. In northern gulfs and bays larger prawns are taken by commercial trawlers. Fishing centres are at Shark Bay, Exmouth Gulf and Nickol Bay. The main species are the Western King Prawn, *Penaeus latisulcatus*, Brown Tiger Prawn, *P. esculentus* and Banana Prawn, *P. merguensis*. Two species of shovel-nosed lobsters sometimes taken in trawls are the Moreton Bay Bug, *Thenus orientalis*, and the Balmain Bug, *Ibacus peroni*.

The Blue Swimming Crab, *Portunus pelagicus*, is plentiful in summer in the estuary of the Swan River and at Mandurah. The large edible crab, *Hypothalassia armata* occurs in deep water between Rottnest Island and Geraldton. Possibly two species of large edible mud crab (*Scylla*) occur in the mangroves of the north.

Crustaceans of the inland waters fall into the ecological climate-dependent groupings mentioned on page 61. The Cherrabun (*Macrobrachium*), a large freshwater prawn, occurs in permanent pools of the Kimberley.

Ephemeral inland waters are often inhabited by shield shrimps (*Triops*, *Lepidurus*), fairy or brine shrimps *Artemia*, *Parartemia* and *Branchinella* and water fleas *Cladocera*. These produce resistant eggs which survive in dry sediment for years, hatch after

occasional rains, grow rapidly to maturity and breed before the water dries up.

Permanent inland waters support copepods (especially *Boeckella*), water fleas (*Cladocera*) and shelled fairy shrimps (*Conchostraca*).

Several species of freshwater crayfish occur in the south-west. The Marron, *Cherax tenuimanus*, lives in permanent streams with deepwater pools; the Jilgie, *C. quinquecarinatus* in shallow permanent water, while the Koonac, *C. preissi* burrows in swamps. Three other crayfish species of *Engaewa* live in isolated seepages and swamps. The 'White Yabbie', *C. Albidus* has been introduced from south-eastern Australia into many wheatbelt dams for local consumption. The shrimp *Palaemonetes australis* is abundant in fresh water and estuaries.

Spiders, Ticks, Scorpions, Centipedes and Millipedes ⁽¹²⁾

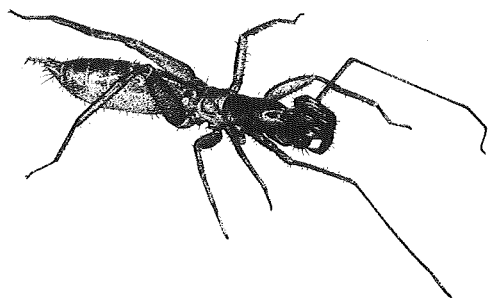
The most common, most widespread and conspicuous families of spiders are the Araneidae (orbweavers), Lycosidae (wolf spiders), Theridiidae (combfooted spiders), Sparassidae (huntsman spiders) and certain trapdoor spiders. Males of the latter group wander away from their burrows during the mating season and often invade gardens and occasionally houses when they may be confused with the venomous funnel-web spiders (*Atrax*) of the eastern states. Pest and poisonous species include the notorious Redback Spider *Latrodectus mactans hasseltii*. There have been no fatalities from this spider since the advent of an antivenene.

The commonest native tick is the Ornate Kangaroo Tick *Amblyomma triguttatum*. In addition to its normal host this tick attaches to a wide range of creatures including lizards, rabbits, horses, cattle and sheep, and occasionally humans. Other common examples of hard-bodied (ixodid) ticks are the introduced species such as the Dog Tick *Rhipicephalus sanguineus* and the Cattle Tick, *Boophilus microplus*. The best known example of the soft-bodied (argasid) family is the cosmopolitan Fowl Tick *Argas*. Fortunately, local ticks are not known to infect their hosts with dangerous viral and other diseases.

(11) Contributed by P.F. Berry, D.S. Jones and G.J. Morgan

(12) Contributed by L.E. Koch and B.Y. Main

Three families and five genera of scorpions are represented in Western Australia. The large widespread *Urodacus* scorpions (twelve species) live in deep spiral burrows and sometimes enter houses or fall into swimming pools. The medium-sized to very large centipedes, which are colourful and mostly banded, belong to the family Scolopendridae, and include the cosmopolitan, *Scolopendra morsitans*, ten native species of the genus *Cormocephalus* and five of *Ethmostigmus*. There are numerous species in other families.



The micro-whip scorpion, *Schizomus vinei*, known only from caves in Cape Range, North West Cape.

About fifteen genera of millipedes have been recorded including several introduced species. They feed on plant debris and are harmless, but some emit dark, toxic secretions. Minute polyxenids travel in vast masses in some years in the Pilbara.

REFERENCES

General

Dakin, W.J. *Australian seashores*. Sydney 1976.

Keast, A. (ed) *Ecological Biogeography of Australia*. Vols 1-3 Junk, The Hague, 1981.

Geological Survey of Western Australia, 1975. *Geology of West. Australia: West. Australia Geol. Survey, Mem. (2): 1-541.*

Vertebrates

Allen, G.R. *Inland fishes of Western Australia*. Western Australian Museum, Perth, 1982.

Hutchins, J.B. & Thompson, M. *The Marine and Estuarine Fishes of South-western Australia. A Field Guide for Anglers and Divers*. Western Australian Museum, Perth 1983.

Serventy, D.L. & Whittell, H.M. *Birds of Western Australia*. 5th ed. University of Western Australia Press, Perth, 1976.

Storr, G.M. & Johnstone, R.E. *Field Guide to the Birds of Western Australia*. 2nd ed. Western Australian Museum, Perth, 1985.

Storr, G.M. & Johnstone, R.E. *Lizards of Western Australia. I. Skinks*. University of Western Australia Press with Western Australian Museum, Perth, 1981.

Storr, G.M., Smith, L.A. & Johnstone, R.E. *Snakes of Western Australia*. Western Australian Museum, Perth 1986

Strahan, R. (ed) *The Australian Museum Complete Book of Australian Mammals*. Angus and Robertson, 1983.

Tyler, M.J., Smith, L.A. & Johnstone, R.E. *Frogs of Western Australia*. Western Australian Museum, Perth 1984.

Invertebrates

Carlgren, O., 1954. Actinaria and Zoantharia from South and West Australia. *Arkiv Zoolog.* 6 (34): 571-95.

Clark, H.L. *The Echinoderms of Australia*. Carnegie Institution of Washington, Publication 556. Washington D.C., 1946.

Marsh, L.M., 1976. Western Australian Asteroidea since H.L. Clark. *Thalassia Jugoslavica* vol. 12 (1): 213-25

George, R.W. 1968. Tropical spiny lobsters, *Panulirus* spp., of Western Australia (and the Indo-West Pacific). *J. Roy. Soc. W. Aust.*, 51 (2): 33-8.

George, R.W, Morgan, G.R. & Phillips, B.F. 1979 The Western Rock Lobster. *J. Roy. Soc. W. Aust.*, 62:45-51.

Koch, L.E. *The Redback Spider and other Venomous Creatures*. Western Australian Museum, Perth, 1980.

Koch, L.E. 1977. The Taxonomy, Geographic Distribution and Evolutionary Radi-

ation of Australo-Papuan Scorpions. *Rec. W. Aust. Mus.* 5(2): 82-367.

Koch, L.E. 1983. Morphological Characters of Australian Scolopendrid Centipedes, and the Taxonomy and Distribution of *Scolopendra morsitans* L. (Chilopoda: Scolopendridae: *Scolopendrinae*). *Aust. J. Zool.* 31 79-91.

Koch, L.E. 1985. Pincushion millipedes (Diploda: Polyxenidae): their aggregations

and identity in Western Australia. *West. Aust. Nat.* 16 (2/3): 30-32.

Marsh, L.M. & Slack-Smith S.M. *Sea stingers and other poisonous marine invertebrates of Western Australia*. Western Australian Museum, Perth, 1986.

Roberts, F.H.S. *Australian Ticks*. C.S.I.R.O., Melbourne, 1970.

Wells, F.E. & Bryce C.W. *Seashells of Western Australia*. Western Australian Museum, Perth, 1985.

Entomology in Western Australia

with particular reference to agriculture

Contributed by the Entomology Branch, Department of Agriculture

The entomological field in Western Australia is so vast and the number of active workers on the subject so few that much still remains to be learned about the insects found in this State.

No attempt is made here to cover all the various orders of insects which occur in the State, mention being made only of those of economic importance. Reference is also made to beneficial insects and mites which have been introduced for the control of agricultural pests. In Western Australia, the use of natural agents in pest control is an increasingly important facet of agricultural research.

CLASS COLLEMBOLA (Springtails)

Order Collembola (Springtails)

This group includes the lucerne flea, *Sminthurus viridis* (Linnaeus) which was introduced into this State from eastern Australia in about 1910 and is a very serious pasture pest. Partial control is exercised by the predatory pasture snout mite, *Bdellodes lapidaria* (Kramer).

CLASS INSECTA (Insects)

Orders Orthoptera, Mantodea, Blattodea, Phasmatodea (Grasshoppers, Locusts, Mantids, Cockroaches, etc).

The most important grasshopper form is the small plague grasshopper, *Austroicetes*

cruciata (Saussure). For breeding it favours hard, bare soil and as extensive areas once utilised for wheat growing have now reverted to grazing, these uncultivated tracts periodically give rise to serious grasshopper swarms which menace the adjacent wheat lands. The Australian plague locust, *Chortoicetes terminifera* (Walker) occurs in Western Australia but rarely as a plague species. During the last few years, the wingless grasshopper, *Pseudacridium vittatum* (Sjöstedt) has been causing increasing damage to lucerne and other summer crops. In the Kimberley the yellow-winged locust, *Gastrimargus musicus* (Fabricius), the migratory locust, *Locusta migratoria* (Linnaeus) and the spur-throated locust, *Austracris guttulosa* (Walker) assume plague proportions.

The cockroach fauna includes a large number of native species as well as several introduced forms.

Order Isoptera (Termites)

The so-called white ant is a serious pest in all parts of the State. Among the most important species may be cited the giant termite, *Mastotermes darwiniensis* Froggatt of the north and the widely distributed subterranean termite, *Coptotermes acinaciformis* (Froggatt). Heavy annual losses are caused by termite damage.

Order Phthiraptera (Lice)

Indigenous species occur on birds and native mammals, and various introduced forms

infest domestic poultry, horses, cattle and sheep.

Order Thysanoptera (Thrips)

The most serious native species is the plague thrips, *Thrips imaginis* Bagnall which may swarm in apple blossoms and seriously affects the crop setting. *Thrips tabaci* Lindeman, the onion thrips, is a carrier for the plant disease spotted wilt. Severe damage to tomato plants may result from this virus.

Order Hemiptera (Bugs, Aphids, Scale Insects)

This group contains a large number of pest species, many of them introduced. The green vegetable bug, *Nezara viridula* (Linnaeus) is now present throughout the State but is controlled by the introduced parasitic wasp, *Trissolcus basalidis* (Wollaston). The native Rutherglen bug, *Nysius vinitor* Bergroth may at times swarm on vegetables and fruit trees. The crusader bug, *Mictis profana* (Fabricius) normally feeds on acacias and other native plants but may be troublesome to citrus. The apple dimpling bug, *Campylomma livida* Reuter is a native species which causes severe malformation of apples.

Numerous introduced aphid species occur as pests on vegetables, garden plants and fruit trees. The green peach aphid, *Myzus persicae* (Sulzer) occurs on peaches, potatoes, rape, etc.; citrus and apple trees are attacked by the black citrus aphid, *Toxoptera citricidus* (Kirkaldy) and the woolly aphid, *Eriosoma lanigerum* (Hausmann) respectively, and the cabbage aphid, *Brevicoryne brassicae* (Linnaeus) is found on cabbages, cauliflower, rape, etc. The cowpea aphid, *Aphis craccivora* Koch and other species transmit two common virus diseases to lupins. Several introduced legume aphids e.g. spotted alfalfa aphid, *Therioaphis trifolii* (Monell) f. *maculata*, and bluegreen aphid, *Acyrtosiphon kondoi* Shinji have been recorded since 1978. These are now controlled by introduced parasitic wasps.

Scale insects (Coccidae) are important horticultural pests. These include San José scale, *Comstockaspis perniciosus* (Comstock), which is a serious pest of apples; red scale, *Aonidiella aurantii* (Maskell), which is found mainly on citrus; black scale, *Saissetia oleae* Bernard, which is found attacking citrus, stone fruits and

garden shrubs; white wax scale, *Gascardia destructor* (Newstead), which is mainly a pest of citrus but also attacks cultivated shrubs; soft brown scale, *Coccus hesperidum* Linnaeus, which has a wide host range but is of greatest importance on citrus.

Order Coleoptera (Beetles)

This order is represented in Western Australia by many and varied forms.

The ladybirds (Coccinellidae) have considerable economic importance and in addition to native species the State contains a number specially introduced to combat various scale insects and aphids. These include the mealybug ladybird, *Cryptolaemus montrouzieri* Mulsant and the common spotted ladybird, *Harmonia conformis* (Boisduval). *H. conformis*, in conjunction with the parasitic wasp, *Aphelinus mali* (Haldeman), plays an important role in combatting the woolly aphid of apple trees. Leaf-eating ladybirds of the genus *Henosepilachna* attack vegetables, especially pumpkins and melons.

The cockchafers or scarabs (Scarabaeidae) are represented by a great diversity of forms. Several species known as spring beetles may swarm on to flowering fruit trees and roses in early summer. The bronze-coloured *Colymbomorpha vittata* Britton is a common pest of apple trees and the saddle-backed beetle, *Phyllotocus ustulatus* Blanchard sometimes visits citrus blossoms in large numbers. The introduced African black beetle, *Heteronychus arator* (Fabricius) is a troublesome pest of lawns, turf, pastures and vegetables. A native species of *Colpochilodes* has caused spasmodic damage to cereal crops and clover pastures in the southern portions of the State.

The longicorn beetles (Cerambycidae) are a group of wood-boring insects, but healthy trees are seldom seriously affected. They are not a pest of structural timber as they do not attack seasoned material.

The leaf beetles (Chrysomelidae) may superficially resemble ladybirds. Common pest species in the north of the State are the pumpkin beetles, *Aulacophora hilaris* (Boisduval) and *A. abdominalis* (Fabricius).

The weevil group (Curculionidae) contains a number of pest species. The rice weevil, *Sitophilus oryzae* (Linnaeus) is our principal weevil pest of stored grain, but the granary weevil, *S. granarius* (Linnaeus) also occurs. Two orchard pests are the introduced apple weevil, *Otiorynchus cribricollis* Gyllenhal and Fuller's rose weevil, *Asynonychus cerwinus* (Boheman). The small lucerne weevil, *Artichonotus taeniatulus* (Berg), and the whitefringed weevil, *Graphognathus leucoloma* (Boheman) attack the roots of lucerne and potato tubers. Two other introduced pest species are the sitona weevil, *Sitona discoideus* Gyllenhal, and the garden weevil, *Phlyctinus callosus* Boheman.

Order Diptera (Flies, Mosquitoes, etc.)

This group contains a number of species, of major economic importance.

The mosquitoes are well represented, including the brown house mosquito, *Culex quinquefasciatus* Say and the dengue mosquito, *Aedes aegypti* (Linnaeus). The anophelines are represented by the widely distributed *Anopheles annulipes* Walker. *A. annulipes*, together with *Aedes alboannulatus* Macquarie, have played an important part in the spread of the rabbit virus *Myxomatosis*.

Of the introduced flies, those causing most trouble are the Australian sheep blowfly, *Lucilia cuprina* (Wiedemann), and the Mediterranean fruit fly, *Ceratitis capitata* (Wiedemann). The western goldenhaired blowfly *Calliphora albifrontalis* Malloch and the lesser brown blowfly, *Calliphora nociva* Hardy are also important in sheep strike. The buffalo fly, *Haematobia irritans exigua* de Meijere is a serious stock pest in the Kimberley.

The common house fly, *Musca domestica* Linnaeus is widespread as is also the native bush fly, *Musca vetustissima* Walker.

Of the many useful flies may be mentioned the tachinids which parasitise caterpillars, grasshoppers and other pests and the bee flies (Bombyliidae) which parasitise the eggs of other insects.

Order Siphonaptera (Fleas)

The poultry stickfast flea, *Echidnophaga gallinacea* (Westwood) is mainly a pest of poultry and domestic animals. The oriental rat flea, *Xenopsylla cheopis* (Rothschild), the

human flea, *Pulex irritans* Linnaeus and the cat and dog fleas, *Ctenocephalides felis* (Bouché) and *C. canis* (Curtis) are among the most important introduced species.

Order Lepidoptera (Moths, Butterflies, etc.)

The caterpillars of a group of small native moths of the family Pyralidae, commonly known as pasture webworms, *Hednota pedionama* (Meyrick), *H. crypsichroa* Lower etc. are serious pests of cereal crops (excepting oats) and grass pastures.

A family of considerable interest is the Tortricidae, in which group are included the codling moth, *Cydia pomonella* (Linnaeus) and the oriental fruit moth, *C. molesta* (Busck). Outbreaks of both insects have occurred in Western Australia but drastic eradication measures have ensured that this State remains free of these serious orchard pests.

The family Noctuidae contains several important pests, including the native budworm and the cotton bollworm, *Heliothis punctigera* Wallengren and *H. armigera* (Hübner), the cluster caterpillar, *Spodoptera litura* (Fabricius), the rough bollworm, *Earias huegeli* Rogenhofer, the brown cutworm, *Agrotis munda* Walker, the southern armyworm, *Persectania ewingii* (Westwood), the common armyworm, *Mythimna convecta* (Walker) and the northern armyworm, *Mythimna separata* (Walker). The fruit piercing moth, *Othreis materna* (Linnaeus) also belongs to this group and causes heavy losses in citrus fruit in the Kimberley and the north-west.

Other common moth pests are the cabbage moth, *Plutella xylostella* (Linnaeus), the potato moth, *Phthorimaea operculella* (Zeller) and the apple looper, *Chloroclystis laticostata* (Walker).

Two butterflies of economic importance, both introduced, are the cabbage white butterfly, *Pieris rapae* (Linnaeus) and the orange palmdart, *Cephrènes augiades sperthias* (Felder).

Order Hymenoptera (Ants, Wasps, Bees)

Of the ants, (Formicidae) one of the best-known native species is the meat ant, *Iridomyrmex purpureus* (F. Smith), which often nests on gravel paths and roadsides.

Two important introduced ant pests are the Argentine ant, *Iridomyrmex humilis* (Mayr), and the Singapore ant, *Monomorium destructor* (Jerdon). The Argentine ant was once widespread in metropolitan and country areas, but has been reduced in recent years, as a result of a large-scale control campaign.

The sawflies (Pergidae and Tenthredinidae) are represented locally by a number of native forms. The larvae of the genus *Perga*, often called spitfires, eat foliage of eucalypts. An introduced sawfly, the pear and cherry slug, *Caliroa cerasi* (Linnaeus), is a common pest on pear and plum trees. Another introduced sawfly known as the leafblister sawfly, *Phylacteophaga froggatti* Riek causes severe disfigurement to various eucalypts.

The smaller parasitic wasps (ichneumonids, chalcids, braconids etc), are well represented and play an important role in combating many insect pests. Some attack insect eggs while others parasitise caterpillars, aphids and scale insects.

The social wasps (Vespidae) include the common paperwasp, *Polistes humilis synoecus* Saussure and the yellow paperwasp, *P. dominulus* (Christ). Both are introduced species and can inflict painful stings.

The European wasp, *Vespula germanica* (Fabricius) was first detected in Western Australia in January 1977. Subsequent surveys and follow-up of reports from the public resulted in a further thirty-two nests

being found in the metropolitan area and at Albany. All nests of this troublesome exotic insect have been destroyed.

The European wasp is similar in appearance to a honey bee but has distinct bright yellow and black markings across the body.

REFERENCES

More detailed information relating to the forms of economic importance will be found in the publications of the Western Australian Department of Agriculture.

Literature covering the general aspects of Australian entomology is given below. Some of these publications are now out of print and possibly only obtainable through libraries.

Anon. *The Insects of Australia*. Division of Entomology, C.S.I.R.O. University Press, Melbourne, 1970. 1,029 pp.

Common, I.F.B. *Australian Moths*. Jacaranda Press, Brisbane, 1963. 128 pp.

Goode, John. *Insects of Australia*. Angus and Robertson Pty Ltd., Sydney, 1980. 260 pp.

Healy, Anthony & Smithers, Courtenay. *Australian Insects in Colour*. A.H. & A.W. Reed, Sydney, 1971. 112 pp

McKeown, K. C. *Australian Insects*. An Introductory Handbook. Published by R.Z.S. of N.S.W., Sydney, 1945. 303 pp.

Natural Regions

(Contributed by Rex T. Prider, B.Sc., Ph.D., F.G.S. Emeritus Professor of Geology, University of Western Australia)

The physical features, geology, climate, flora and fauna of Western Australia have been outlined in this and the two preceding Chapters and the subdivision of the State into 'natural regions' may now be considered. A Natural Region is one clearly marked off from neighbouring regions by topographical, geological, climatic, or biological conditions, or by combinations of these, so that, as far as human activities are concerned, they have different economic possibilities.

Many methods for the subdivision of the State have been suggested—based on climate, soil and ecology, physiography (geomorphology) and geology (including geological structure). These, together with Land and Statistical Divisions, have been dealt with in some detail by Gentili in *Western Landscapes*, pp. 3-48. The scheme of 'natural regions' summarised in Table 4.1, which was first devised by E. de C. Clarke in 1926, taking note of all these variables, has stood the test of time well, although some of its details, in view of our increase

in geological knowledge of the State and utilisation of light country by minor element

studies, could be revised, and a finer division into subregions made.

TABLE 4.1 - CHARACTERISTICS OF THE NATURAL REGIONS OF WESTERN AUSTRALIA

The subdivision of Western Australia into Natural Regions (see Diagram 4.1) has been described by E. de C. Clarke in *J. Roy. Soc. W. Aust.*, vol. XII, 1927, pp. 117-32. A summary of the characteristics of these different Natural Regions (reprinted by courtesy of the University of Western Australia Press from Clarke, Prider and Teichert: *Elements of Geology for Western Australian Students*) is given below.

NATURAL REGION	TOPOGRAPHY	GEOLOGY	RAINFALL	WATER SUPPLY (a)	VEGETATION ETC
ANTRIM (geographic)	Tableland	Cambrian sediments and lavas	Summer monsoonal, 500 to 1,060 millimetres	Catchments, wells and artesian	Grassland and savannah
NORTH KIMBERLEY (geographic)	Dissected stony tableland	Younger Precambrian	Summer, monsoonal, 750 millimetres or more	Streams, springs, catchments	Luxuriant in valleys, sparse on tableland
FITZROY (chief river)	Very wide valleys and low hills	Palaeozoic (largely Permian)	Summer, monsoonal, 500 to 750 millimetres	Catchments and artesian	Grassland and savannah
CANNING (A W Canning Surveyor and Explorer)	Sandridges and table-top hills	Palaeozoic and Mesozoic	Summer, 375 millimetres or less	Springs, pools, artesian water (undeveloped)	'Spinifex' (species of <i>Triodon</i>) and desert shrubs
NORTH WEST (common usage)	Rugged hills. Rivers in well defined valleys	Older and Younger Precambrian. Many economic minerals	Variable, unreliable 375 millimetres or less	Wells, catchments, pools	'Spinifex', few shrubs and trees
CARNEGIE, David Carnegie (explorer)	Sand ridges and table-top hills	Palaeozoic Mesozoic, Younger Precambrian	Variable and unreliable, probably about 125 millimetres	Catchments, wells	'Spinifex' and desert shrubs
WARBURTON (Warburton Ranges)	Hills (some over 900 metres) separated by sandy country	Older Precambrian	Variable and unreliable, perhaps about 125 millimetres. Probably better than Carnegie Region owing to high hills	Catchments, wells, some springs	'Mulga' (species of <i>Acacia</i>) and 'Spinifex'
MURCHISON (common usage)	Ridge hills and break-aways. Rivers in shallow beds. Salt 'lakes'	Older Precambrian Economic minerals especially gold	Summer or winter, unreliable, 250 millimetres or less and nickel	Wells (potable groundwater)	'Mulga'. Eucalypts scarce except along rivers
KALGOORLIE (chief town)	Less hilly than Murchison. Salt 'lakes'. No defined watercourses except salt lake system	Older Precambrian Economic minerals especially gold and nickel	Mainly winter, unreliable, 250 millimetres or less	Catchments. Ground water too salty for use	Eucalypt forest especially Salmon Gum (<i>E. salmonophloia</i>), Gimlet (<i>E. salubris</i>) and Red Morrel (<i>E. longicornis</i>)
WHEAT BELT (common usage)	Same as Kalgoorlie region	Older Precambrian but few 'greenstones'	Winter, reliable 250 to 500 millimetres	Similar to Kalgoorlie Region, but ground water potable in many places; therefore wells frequent	Eucalypt forest—Salmon Gum, Gimlet and Morrel
JARRAH (chief timber)	More dissected than Wheat Belt Region, especially near Darling Scarp	Like Wheat Belt Region but there is an extensive cuirass of laterite	Winter, reliable 635 to 1,000 millimetres	Streams and springs	Forest of Jarrah (<i>E. marginata</i>), Wandoo (<i>E. Diversicolor</i>), Karri (<i>E. calophylla</i>) and Marri
CARNARVON (chief town)	Elevated plain with table-top	Palaeozoic Mesozoic, Tertiary	Summer or winter very	Artesian in many places.	Sparse scrub in north, denser in

TABLE 4.1 - CHARACTERISTICS OF THE NATURAL REGIONS OF WESTERN AUSTRALIA—*continued*

NATURAL REGION	TOPOGRAPHY	GEOLOGY	RAINFALL	WATER SUPPLY (a)	VEGETATION ETC
	hills	and later	unreliable about 250 millimetres	Catchments, pools	south
GREENOUGH (river)	Sandstone tableland	Mesozoic and older	Winter, 375 to 500 millimetres	Springs, wells and catchments	Scrub
PERTH (chief town)	Coastal plain	Mesozoic and later	Winter, reliable, 500 to 875 millimetres	Springs, wells, artesian	Scrub, swamp and forest
STIRLING (prominent range)	Undulating tableland with abrupt ranges	Siliceous Tertiary sediments with inliers of Older and Younger Precambrian	Winter, 375 millimetres or less	Catchments, Stream water generally too salty for use	Heath and swamp
NULLARBOR (geographic)	Tableland, no hills	Calcareous Tertiary sediments	Winter, 250 millimetres or less	Catchments, subartesian	Poor grassland

(a) 'Wells' refers to those that draw on ground water, but are not artesian. 'Catchments' refers to water collected on the surface—naturally in gnamma holes, artificially by conserving the run-off. 'Pools' refers to pools in watercourses and includes rock holes.

REFERENCES

Clarke, E. de C. Natural Regions in Western Australia. *J. Roy. Soc. W. Aust.*, vol. XII, 1927, pp. 117-32.

Gentili, J (ed.). *Western Landscapes*. University of Western Australia Press (Sesquicentenary Series), Nedlands, 1979.

Chapter 5

CONSTITUTION AND GOVERNMENT

Western Australia is one of the six federated sovereign States which, together with the Northern Territory and the Australian Capital Territory, constitute the Commonwealth of Australia. Thus, in addition to having its own Parliament and executive government, it is represented in the federal legislature. As well as government at the Federal and State levels, there is a third system, that of local government, which functions through City Councils, Town Councils and Shire Councils.

OUTLINE OF CONSTITUTIONAL DEVELOPMENT

A Legislative Council was established in Western Australia shortly after its foundation as a Crown Colony and sat for the first time in February 1832. The Council was non-elective and consisted of the Governor and four senior officials. In 1839, membership was increased to nine when the Governor nominated four unofficial members. Additional appointments were made from time to time until the dissolution of the nominee Legislative Council in 1870 with the inauguration of representative government as provided for in the Australian Colonies Government Act of 1850. This Act, which enabled the establishment of representative governments in other Australian Colonies, withheld the privilege from Western Australia until such time as the Colony should be able to defray all costs of government from its own revenues, and it was not until 1870 that it was felt that Western Australia was able to satisfy this condition. The new Legislative Council, elections for which took place in October of that year, consisted of twelve elected members, three nominees and three officials. The number of members of the Council was increased in 1874 to 21, of whom 14 were elected, in 1882 to 24, of whom 16 were elected and in 1886 to 26, comprising 17 elected members, 5 nominees and 4 officials.

Following the passage by the Legislative Council of a Constitution Act in 1889 and subsequent representations made in London by delegates sent from the Colony, responsible government was granted to Western Australia by an Imperial Act assented to on 15 August 1890. Provision was made for the establishment of a Parliament of two

Houses, to be known as the 'Legislative Council' and the 'Legislative Assembly', to replace the old Council. Proclamation of responsible government was made in Perth on 21 October 1890 and election of the thirty members of the Legislative Assembly took place in November and December. The fifteen members of the Legislative Council were nominated by the Governor, as provided for in the Constitution Act, and the Parliament was officially opened on 30 December 1890. The Constitution Act of 1889, while prescribing a Council which was originally nominative, contained a provision that, after the expiration of six years or on the population of the Colony reaching 60,000, the Council should become fully elective. The required population was attained in 1893 and an amendment to the Act in that year enabled the election of twenty-one members to the Legislative Council, and at the same time increased the Legislative Assembly to thirty-three members. By an amendment of 1899, membership of the Legislative Council was raised to thirty and of the Legislative Assembly to fifty. Provision was made for the Legislative Assembly to be increased to fifty-one members by the *Constitution Acts Amendment Act (No. 2) 1965*. The increase in numbers, however, did not become effective until the State general election in 1968.

On 1 January 1901, Western Australia and five other Australian Colonies were federated under the name of the 'Commonwealth of Australia', authority for the union having been given by the Commonwealth of Australia Constitution Act which was passed by the British Parliament in 1900. By a provision of the Constitution Act the constituent parts of the Commonwealth previously designated 'Colonies' be-

came known as 'States'. Under the Constitution, powers are divided between the Parliaments of the Commonwealth and of the States by conferring power in respect of specific subjects on the Commonwealth either exclusively or jointly with the States, leaving the remaining powers to the States.

Procedure in both Federal and State Parliaments is based on British practice. The legislatures consist of the Sovereign, represented by the Governor-General of Australia or the Governor of the State, and the elected members. In the field of executive government the British 'Cabinet' system has also been adopted. The members of the Cabinets must hold seats in the legislature as elected members. The Cabinet is responsible to the Parliament and continues in office only while holding the confidence of the Parliament. All Cabinet Ministers are members of the Executive Council, the supreme group of advisers to the Crown, and the Cabinet thus provides the executive government of the Commonwealth or the State. The executive Council is presided over by the Governor-General of Australia or the Governor of the State and at its meetings, which are formal and official in character, the decisions of the Cabinet are given legal form, appointments are made, resignations accepted, proclamations issued and regulations approved.

VICE-REGAL REPRESENTATION

The Governor-General of Australia

Under the Commonwealth Constitution, ultimate executive power is vested in the Crown and is exercised by the Governor-General as the direct representative of the Sovereign. Appointment to the office is made by the Crown after consultation with the Prime Minister of the Commonwealth. The present Governor-General is His Excellency the Right Honourable Sir Ninian Martin Stephen, P.C., A.K., G.C.M.G., G.C.V.O., K.B.E., K.St.J., who was sworn in on 29 July 1982. During the absence from Australia of the Governor-General it is usual for the senior among the State Governors to be appointed Administrator.

The Governor of Western Australia

The Governor of Western Australia is the personal representative of the Sovereign in

the State and exercises the powers of the Crown in State matters. He is the titular head of the Government and performs the official and ceremonial functions attaching to the Crown. The present Governor of Western Australia, His Excellency Professor Gordon Stanley Reid, A.C. was sworn in on 2 July 1984. In the event of the Governor's absence from Western Australia the Lieutenant-Governor of the State is appointed Administrator. If there is no Lieutenant-Governor it is customary for the Chief Justice of Western Australia to be appointed Administrator. The present Lieutenant-Governor, the Chief Justice Sir Francis Burt, K.C.M.G., received his commission on 19 April 1977.

The last Governor of Western Australia as a Colony was Lieutenant-Colonel Sir Gerard Smith, K.C.M.G., whose term of office expired on 29 June 1900 and the first Governor of the State was Captain Sir Arthur Lawley, K.C.M.G., who was sworn in on 1 May 1901. The names and dates of assumption of office of Governors and acting Governors from the foundation of the Colony to 1980 are shown in the *Western Australian Year Book*, No. 20—1982.

THE FEDERAL PARLIAMENT

The legislative power of the Commonwealth is vested in a Federal Parliament which consists of Her Majesty the Queen (represented by the Governor-General), a Senate and a House of Representatives. Subject to the Constitution, the Federal Parliament is empowered to make laws concerning, among other things, defence, external affairs, customs and excise, trade and commerce with other countries and among the States, taxation, borrowing of money on public credit, currency and coinage, banking, insurance, navigation, fisheries, quarantine, posts and telegraphs, census and statistics, immigration, naturalisation and aliens, copyrights and trademarks, bankruptcy, marriage, divorce and matrimonial causes, social services, and conciliation and arbitration for the prevention and settlement of industrial disputes extending beyond the limits of any one State. The Constitution provides that, when a law of a State is inconsistent with the law of the Commonwealth, the Commonwealth

law shall prevail and the State law shall, to the extent of the inconsistency, be invalid.

The qualifications necessary for membership of the Federal Parliament and for voting at federal elections are described in *Year Book Australia*. Under the provisions of the *Commonwealth Electoral Act 1973*, which was proclaimed operative from 21 March 1973, the age qualification for enrolment, voting and candidature for federal parliamentary elections was lowered from twenty-one years to eighteen years.

The payment of allowances to Senators and Members of the House of Representatives is provided for in the Constitution and a superannuation scheme is established under the provisions of the *Parliamentary Retiring Allowance Act 1984*.

The Senate

The Senate consisted originally of thirty-six members, six Senators being returned from each State. The Parliament is authorised by the Constitution to increase or decrease the number of members. The growth of the population since Federation having been such as to warrant a considerable enlargement of the Parliament, a Representation Act was passed in 1948 to provide for increased membership by raising from six to ten the number of Senators from each State. A further Representation Act was passed in 1983 increasing the number of Senators for each State from ten to twelve. The counting of votes in elections for the Senate is one of proportional representation. A summary of the procedure is given in the *Western Australian Year Book* No. 24 - 1986 and earlier issues.

Members are elected on the basis of adult suffrage by the people of the State which they represent. As provided by the *Commonwealth Electoral Act 1918*, enrolment as an elector is compulsory for all qualified persons except those who are Aboriginal natives of Australia. Aboriginals, although entitled to enrol, are not required to do so. Voting is compulsory for all enrolled persons in terms of an amendment of 1924 which operated for the first time at elections held on 14 November 1925. The term of office of a Senator is normally six years and commences on the first day of July following his election. One-half of the members

retire at the end of every third year and are eligible for re-election.

Elections for the Senate were last held on 11 July 1987. Table 5.1 shows the Western Australian membership of the Senate at 13 August 1987.

TABLE 5.1 - WESTERN AUSTRALIAN MEMBERS OF THE SENATE

Member	Political party	Year of retirement
Beahan, M.E.	A.L.P.	1990
Chaney, Hon. F.M.	Lib.	1993
Cook, P.F.S.	A.L.P.	1993
Crichton-Browne, N.A.	Lib.	1990
Durack, Hon. P.D., Q.C.	Lib.	1993
Giles, P.J.	A.L.P.	1993
Jenkins, J.A.	A.D.	1990
Knowles, S.C.	Lib.	1993
McKiernan, J.P.	A.L.P.	1990
Panizza, J.H.	Lib.	1990
Vallentine, J.	V.P.G.	1990
Walsh, Hon. P.A.	A.L.P.	1993

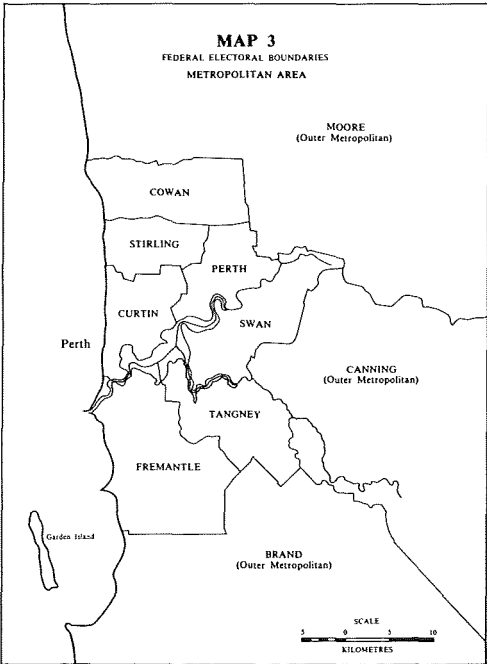
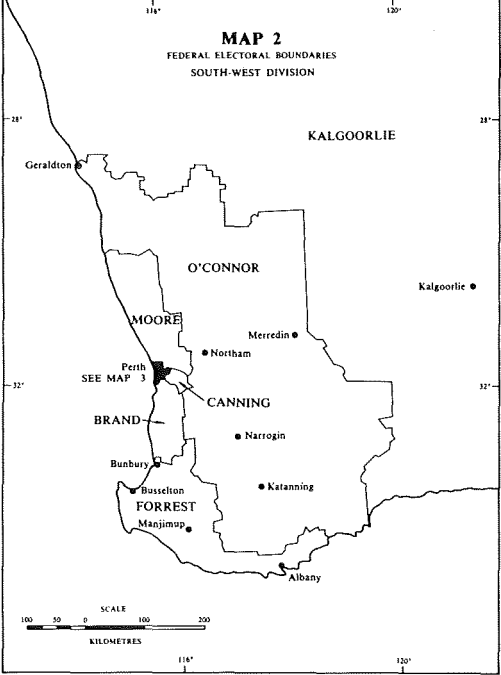
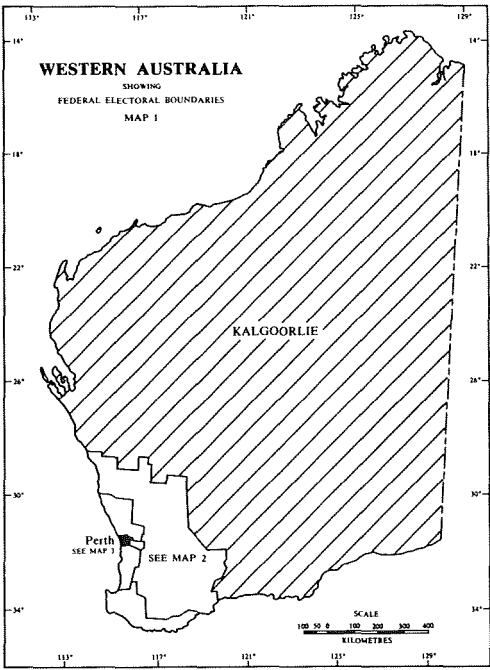
A.L.P. Australian Labor Party. Lib. Liberal Party.
A.D. Australian Democrats. V.P.G. Vallentine Peace Group.

The House of Representatives

State membership of the House of Representatives is on a population basis with the proviso that each State shall have at least five members. The Constitution provides further that the number of members of the House of Representatives shall be, as nearly as practicable, double the number of Senators. With the enlargement of the Senate from thirty-six to sixty members, the membership of the House of Representatives was increased, from the date of the 1949 elections, from seventy-four to 121, not including a member for the Australian Capital Territory, which achieved representation for the first time at this election, and a member for the Northern Territory, which had been represented since 1922.

Subsequent redistributions have increased the number of members of the House of Representatives in line with population growth. At the last election in July 1987, the following numbers of members of the House were elected: New South Wales 51; Victoria 39; Queensland 24; Western Australia 13; South Australia 13; Tasmania 5; plus the Australian Capital Territory 2 and the Northern Territory 1, making a total of 148 seats. Diagram 5.1 shows House of Representatives electorates in Western Australia.

DIAGRAM 5.1



Members of the House of Representatives are elected for the duration of the Parliament—which is limited to three years—by the people of the electorate whom they represent. As provided by the *Commonwealth Electoral Act 1918*, enrolment for electors is the same as for the Senate. Voting is on the preferential system.

Elections for the House of Representatives were last held on 11 July 1987. Table 5.2 shows the Western Australian membership of the House of Representatives at 13 August 1987.

THE STATE PARLIAMENT

The Crown, represented by the Governor, and the Parliament, comprising a Legislative Council and a Legislative Assembly, constitute the legislature of Western Australia. Executive government is based, as in the

case of the Commonwealth and other States, on the system which evolved in Great Britain in the eighteenth century and which is generally known as the 'Cabinet' system. The cabinet consists of Ministers of the

TABLE 5.2 - WESTERN AUSTRALIAN MEMBERS OF THE HOUSE OF REPRESENTATIVES

<i>Electorate</i>	<i>Member</i>	<i>Political party</i>
Brand	Fatin, W.F.	A.L.P.
Canning	Gear, G.	A.L.P.
Cowan	Jakobsen, C.A.	A.L.P.
Curtin	Rocher, A.C.	Lib.
Forrest	Prosser, G.D.	Lib.
Fremantle	Dawkins, Hon. J.S.	A.L.P.
Kalgoorlie	Campbell, G.	A.L.P.
Moore	Blanchard, C.A.	A.L.P.
O'Connor	Tuckey, C.W.	Lib.
Perth	Charlesworth, Dr R.I.	A.L.P.
Stirling	Edwards, R.F.	A.L.P.
Swan	Beasley, Hon. K.C.	A.L.P.
Tangney	Shack, P.D.	Lib.

A.L.P. Australian Labor Party. Lib. Liberal Party of Australia.

TABLE 5.3 - MINISTRIES FROM 1890

<i>Name of Premier</i>	<i>Political party</i>	<i>Date of assumption of office</i>	<i>Duration</i>		
			<i>Years</i>	<i>Months</i>	<i>Days</i>
Forrest		1890—29 December	10	1	17
Throssell		1901—15 February	-	3	12
Leake	(a)	27 May	-	5	25
Morgans		21 November	-	1	2
Leake		23 December	-	6	8
James		1902—1 July	2	1	9
Daglish	Labour	1904—10 August	1	-	15
Rason	Liberal	1905—25 August	-	8	12
Moore	Liberal	1906—7 May	4	4	9
Wilson	Liberal	1910—16 September	1	-	21
Scaddan	Labour	1911—7 October	4	9	20
Wilson	Liberal	1916—27 July	-	11	1
Lefroy	Liberal	1917—28 June	1	9	20
Colebatch	Liberal	1919—17 April	-	1	-
Mitchell	Nat. and C.P. (coalition)	17 May	4	10	30
Collier	Labour	1924—16 April	6	-	8
Mitchell	Nat. and C.P. (coalition)	1930—24 April	3	-	-
Collier	Labour	1933—24 April	3	3	27
Wilcock	Labour	1936—20 August	8	11	11
Wise	Labour	1945—31 July	1	8	1
McLarty	L.C.L. and C.P. (coalition)	1947—1 April	5	10	22
Hawke	Labour	1953—23 February	6	1	10
Brand	L.C.L. and C.P. (coalition)	1959—2 April	11	11	1
Tonkin	A.L.P.	1971—3 March	3	1	5
Court	Lib. and C.P. (coalition)	1974—8 April	7	9	17
O'Connor	Lib. and C.P. (coalition)	1982—25 January	1	1	-
Burke	A.L.P.	1983—25 February	5	-	-
Dowding	A.L.P.	1988—25 February	Still in office (b)		

A.L.P. Australian Labor Party. C.P. Country Party(c). L.C.L. Liberal and Country League(d). Nat. Nationalist.

(a) No specific party designation. (b) At 31 March 1988. (c) The name of the Party was changed to the *National Country Party of Australia (W.A.) Inc.* on 5 May 1975. (d) The name of the Party was changed to *The Liberal Party of Australia (Western Australian Division) Incorporated* on 15 July 1968.

crown chosen for the Ministry from members of Parliament belonging to the political party, or coalition of parties, which is in the majority in the Legislative Assembly. The Constitution requires that at least one of the Ministers be selected from members of the Legislative Council. In Western Australia, as in the other Australian States, the office of principal Minister is designated 'Premier'.

Since 1890, when responsible government was granted to Western Australia, there have been twenty-seven separate Ministries as shown in Table 5.3. No organised political party existed in the Colony until the formation of a Labour party in the 1890s. A Labour Ministry assumed office in 1904.

TABLE 5.4 - THE MINISTRY

<i>Name of Minister</i>	<i>Title of Office</i>
Hon. Peter M'Callum Dowding, LL.B., M.L.A.,	Premier; Treasurer; Minister for Productivity; Public Sector Management; Women's Interests.
Hon. David Charles Parker, B.A., J.P., M.L.A.,	Deputy Premier; Minister for Economic Development and Trade.
Hon. Joseph Max Berinson, Q.C., M.L.C.,	Attorney General; Minister for Budget Management; Corrective Services; Leader of the Government in the Legislative Council.
Hon. Elsie Kay Hallahan, B.S.W., (Curtin), J.P., M.L.C.,	Minister for Community Services; the Family; Youth; the Aged; Minister assisting the Minister for Women's Interests; Deputy Leader of the Government in the Legislative Council.
Hon. Jeffrey Phillip Carr, B.A., J.P., M.L.A.,	Minister for Mines; Local Government; Regional Development.
Hon. Robert John Pearce, B.A., Dip. Ed., J.P., M.L.A.,	Minister for Transport; Planning; Parliamentary and Electoral Reform; Intergovernmental Relations; Leader of the House in the Legislative Assembly.
Hon. Barry James Hodge, M.L.A.,	Minister for Conservation and Land Management; Environment; Waterways.
Hon. Julian Fletcher Grill, LL.B., J.P., M.L.A.,	Minister for Agriculture; The South West; Fisheries.
Hon. Keith James Wilson, M.L.A.,	Minister for Health.
Hon. Ian Frederick Taylor, B. Econ. (Hons), J.P., M.L.A.,	Minister for Police and Emergency Services; Minister assisting the Treasurer.
Hon. Pamela Anne Beggs, J.P., M.L.A.,	Minister for Housing; Tourism; Racing and Gaming.
Hon. Gavan John Troy, B. Bus., A.F.A.I.M., J.P., M.L.A.,	Minister for Labour; Works and Services; Minister assisting the Minister for Productivity and Public Sector Management.
Hon. Ernest Francis Bridge, M.L.A.,	Minister for Water Resources; Small Business; The North West; Aboriginal Affairs.
Hon. Gordon Leslie Hill, J.P., M.L.A.,	Minister for Employment and Training; Multicultural and Ethnic Affairs; Minister assisting the Minister for Education with TAFE.
Hon. Graham John Edwards, M.L.C.,	Minister for Consumer Affairs; Sport and Recreation.
Hon. Yvonne Daphne Henderson, B.A., Dip. Ed., J.P., M.L.A.,	Minister for Lands; The Arts.
Dr Carmen Mary Lawrence, B. Psych., Ph. D., M.L.A.,	Minister for Education.
Hon. John Bell Read, J.P.,	Parliamentary Secretary of the Cabinet.

The Constitution of 1889 provided for a Ministry of five members. This number was increased by subsequent amendments to the Act to the present number of seventeen Ministers. The names of the Ministers and the portfolios held by them at 25 February 1988 are shown in Table 5.4.

The right to vote at parliamentary elections was extended to women by the *Constitution Acts Amendment Act 1899* and membership of either House was provided for by the *Parliament (Qualification of Women) Act 1920*. The first woman member of any

Australian Parliament was Mrs Edith Dircksey Cowan, O.B.E., who was elected to the Legislative Assembly in March 1921 as member for West Perth. Mrs A.F.G. (later Dame Florence) Cardell-Oliver, M.L.A. for Subiaco became the first woman Cabinet Minister in Australia when she joined the McLarty Ministry in 1947.

Payment of members was introduced in 1900 by a Payment of Members Act and a superannuation fund operates under the *Parliamentary Superannuation Act 1970*.

The State is divided into seventeen Electoral Provinces, returning thirty-four members of the Legislative Council. The Electoral Provinces are divided into fifty-seven Electoral Districts, each returning one member to the Legislative Assembly. The Electoral Provinces and their component Electoral Districts are shown in Table 5.5.

Under the provisions of the *Acts Amendment (Electoral Reform) Act 1987*, which came into operation on 30 October 1987, three Electoral Distribution Commissioners were appointed to divide the State into fifty-seven districts — thirty-four comprising the Metropolitan Area (as described in the *Metropolitan Region Town Planning Scheme Act 1959*, as at 1 January 1987) and twenty-three the remainder of the State. These districts are to return one member each to the Legislative Assembly.

The State is also to be divided into six regions—three Metropolitan regions consisting of the Metropolitan electoral districts, a South-West region, an Agricultural region and a Mining and Pastoral region consisting of the electoral districts comprising the remainder of the State. The North Metropolitan Region and the South-West Region will each return seven members to the Legislative Council, and the other electoral regions will each return five Council members.

The division process, which included opportunities for public submissions and comment, was completed on 29 April 1988, when the final division was gazetted. This division will apply to the next two general elections for the Legislative Assembly.

A further provision of the Act extends the terms of members of both Houses of Parliament to four years, commencing with the next State general election.

The Legislative Council

At 31 March 1988 the Legislative Council consisted of thirty-four members, each of the seventeen electoral provinces into which the State was divided being represented by two members. The current term for members is six years and one-half of the members retire every three years. Under the provisions of the *Acts Amendment*

TABLE 5.5 - ELECTORAL PROVINCES AND ELECTORAL DISTRICTS

<i>Electoral province</i>	<i>Component electoral districts</i>
METROPOLITAN AREA	
Metropolitan	Cottesloe Floreat Nedlands Perth Subiaco
North Metropolitan	Joondalup Karrinyup Scarborough Whitfords
North Central Metropolitan	Balcatta Balga Mount Lawley Nollamara
South Central Metropolitan	Clontarf East Melville South Perth Victoria Park
North-East Metropolitan	Ascot Helena Maylands Morley-Swan Welshpool
South Metropolitan	Cockburn Fremantle Melville Rockingham
South-East Metropolitan	Armadale Canning Gosnells Murdoch
AGRICULTURAL, MINING AND PASTORAL AREA	
Central	Avon Merredin Mount Marshall
Lower Central	Collie Narrogin Warren
Lower West	Dale Mandurah Murray-Wellington
South	Albany Katanning-Roe Stirling
South-East	Esperance-Dundas Kalgoorlie
South-West	Bunbury Mitchell Vasse
Upper West	Geraldton Greenough Moore
West	Darling Range Kalamunda Mundaring
NORTH-WEST—MURCHISON-EYRE AREA	
Lower North	Gascoyne Murchison-Eyre
North	Kimberley Pilbara

(*Electoral Reform*) Act 1987, all members shall vacate their seats on 21 May 1989. Subsequently members will be elected for a term of four years.

The composition of the Legislative Council at 31 March 1988 is given in Table 5.6.

TABLE 5.6 - MEMBERS OF THE LEGISLATIVE COUNCIL

<i>Name</i>	<i>Political party</i>	<i>Electoral province</i>
Bell, Hon. Colin John	Lib.	Lower West
Berinson, Hon. Joseph Max, LL.B.	A.L.P.	North Central Metropolitan
Brown, Hon. James McMillan	A.L.P.	South-East
Butler, Hon. Thomas George	A.L.P.	North-East Metropolitan
Caldwell, Hon. John Norman	N.P.A.	South
Charlton, Hon. Eric James	N.P.A.	Central
Dans, Hon. Desmond Keith	A.L.P.	South Metropolitan
Edwards, Hon. Graham John	A.L.P.	North Metropolitan
Evans, Hon. George Maxwell	Lib.	Metropolitan
Gayfer, Hon. Harry Walter	N.P.A.	Central
Griffiths, Hon. Clive Edward	Lib.	South Central Metropolitan
Halden, Hon. Stanley John	A.L.P.	North Metropolitan
Hallahan, Hon. Elsie Kay, B. S.W (Curtin)	A.L.P.	South-East Metropolitan
Helm, Hon. Thomas Richard	A.L.P.	North
Hetherington, Hon. Robert, B.A.	A.L.P.	South-East Metropolitan
House, Hon. Barry John, B. Econ.	Lib.	South-West
Jones, Hon. Beryl Lillian	A.L.P.	Lower West
Kelly, Hon. Garry Kenneth, B.App.Sci (Physics)	A.L.P.	South Metropolitan
Lewis, Hon. Alexander Ashley	Lib.	Lower Central
Lockyer, Hon. Phillip Harry	Lib.	Lower North
McAleer, Hon. Margaret	Lib.	Upper West
McKenzie, Hon. Fred Evan	A.L.P.	North-East Metropolitan
McNeil, Hon. Thomas	N.P.A.	Upper West
Masters, Hon. Gordon Edgar	Lib.	West
Moore, Hon. Norman Frederick, B.A., Dip. Ed.	Lib.	Lower North
Nevill, Mark Warriedar, B.Sc. (Hons.), J.P.	A.L.P.	South-East
Oliver, Hon. Oscar Neil Blackburne, E.D.	Lib.	West
Pendal, Hon. Phillip George	Lib.	South Central Metropolitan
Piantadosi, Hon. Samuel Mathew	A.L.P.	North Central Metropolitan
Stephens, Hon. Thomas Gregory, B.A., J.P.	A.L.P.	North
Stretch, Hon. William Noel	Lib.	Lower Central
Wenn, Hon. Douglas William	A.L.P.	South-West
Williams, Hon. Richard John Lloyd, B.A., J.P.	Lib.	Metropolitan
Wordsworth, Hon. David John	Lib.	South

SUMMARY

Australian Labor Party (A.L.P.)	16
National Party of Australia (N.P.A.)	4
The Liberal Party of Australia (Western Australian Division) Incorporated (Lib.)	14

The Legislative Assembly

Table 5.7 shows the composition of the Legislative Assembly at 31 March 1988.

At 31 March 1988 there were fifty-seven members of the Legislative Assembly, each member representing one of the fifty-seven electoral districts into which the State was

divided for the purpose. Members are elected for the duration of the Parliament, which is limited to three years. Under the provisions of the *Acts Amendment (Electoral Reform) Act 1987* the Legislative Assembly will cease on 31 January 1989. Subsequently, the Legislative Assembly will have a duration of four years.

TABLE 5.7 - MEMBERS OF THE LEGISLATIVE ASSEMBLY

<i>Name</i>	<i>Political party</i>	<i>Electoral district</i>
Alexander, Dr Ian Christopher, B.A.(Hons), M.A., M.Phil., Ph.D.	A.L.P.	Perth
Barnett, Hon. Michael, J.P.	A.L.P.	Rockingham
Beggs, Hon. Pamela Anne, J.P.	A.L.P.	Whitfords
Bertram, Ronald Edward, A.A.S.A.	A.L.P.	Balcatta
Blaikie, Barry Roy	Lib.	Vasse
Bradshaw, John Leslie, M.P.S., J.P.	Lib.	Murray-Wellington
Bridge, Hon. Ernest Francis, J.P.	A.L.P.	Kimberley
Buchanan, Pamela Anne, J.P.	A.L.P.	Pilbara
Burkett, Graham John, J.P.	A.L.P.	Scarborough
Carr, Hon. Jeffrey Phillip, B.A., J.P.	A.L.P.	Geraldton
Cash, Samuel George Ernest, B.Bus., A.C.I.S., J.P.	Lib.	Mount Lawley
Clarko, James George, A.E., B.A., Dip. Ed., M.A.C.E., J.P.	Lib.	Karrinyup
Court, Richard Fairfax, B.Comm.	Lib.	Nedlands
Cowan, Hendy John	N.P.A.	Merredin
Crane, Albert Victor	Lib.	Moore
Cunningham, Edward Joseph	A.L.P.	Balga
Donovan, Francis Anthony, B.S.W. (Dis.)	A.L.P.	Morley-Swan
Dowding, Hon. Peter M'Callum, LL.B.	A.L.P.	Maylands
Evans, Hon. Hywel David, B.A.	A.L.P.	Warren
Gallop, Dr Geoffrey Ian, B.Ec., M.A., M.Phil., D.Phil.	A.L.P.	Victoria Park
Grayden, Hon. William Leonard	Lib.	South Perth
Greig, Robert William	Lib.	Darling Range
Grill, Hon. Julian Fletcher, LL.B., J.P.	A.L.P.	Esperance-Dundas
Hassell, William Ralph Boucher, LL.B., M.A.	Lib.	Cottesloe
Henderson, Hon. Yvonne Daphne, B.A., Dip.Ed., J.P.	A.L.P.	Gosnells
Hill, Hon. Gordon Leslie, J.P.	A.L.P.	Helena
Hodge, Hon. Barry James	A.L.P.	Melville
House, Montague Grant, J.P.	N.P.A.	Katanning-Roe
Jones, Thomas Henry, J.P.	A.L.P.	Collie
Lawrence, Hon. Carmen Mary, B.Psych., Ph.D.	A.L.P.	Subiaco
Lewis, Kennon Richard	Lib.	East Melville
Lightfoot, Phillip Ross	Lib.	Murchison-Eyre
MacKinnon, Barry John, B.Ec., F.A.S.A.	Lib.	Murdoch
Marlborough, Norman Richard	A.L.P.	Cockburn
Maslen, Dudley John	Lib.	Gascoyne
Mensaros, Hon. Andrew	Lib.	Floreat
Parker, Hon. David Charles, B.A., J.P.	A.L.P.	Fremantle
Pearce, Hon. Robert John, B.A., Dip.Ed., J.P.	A.L.P.	Armadale
Read, John Bell, J.P.	A.L.P.	Mandurah
Ripper, Eric Stephen, B.A., Dip.Ed.	A.L.P.	Ascot
Schell, Morton William	N.P.A.	Mount Marshall
Smith, David Lawrence, LL.B., J.P.	A.L.P.	Mitchell
Smith, Phillip John, B.Ed.	A.L.P.	Bunbury
Stephens, Mathew Ernest	N.P.A.	Stirling
Taylor, Hon. Ian Frederick, B.Ec., (Hons.), J.P.	A.L.P.	Kalgoorlie
Thomas, William Ian, B.A.	A.L.P.	Welshpool
Thompson, Hon. Ian David, J.P.	Lib.	Kalamunda
Trenorden, Maxwell Wayne	N.P.A.	Avon
Troy, Hon. Gavan John, B.Bus., A.F.A.I.M., J.P.	A.L.P.	Mundaring
Tubby, Frederick Charles, B.Ed., M.A.C.E.	Lib.	Dale
Tubby, Reginald John, J.P.	Lib.	Greenough
Watkins, Jacqueline Patricia, J.P.	A.L.P.	Joondalup
Watson, Dr Judyth, Cert.Nsg.Ed., B.Sc. (Hons.), Ph.D., J.P.	A.L.P.	Canning
Watt, Leon Harold, J.P.	Lib.	Albany
Wiese, Robert Laurence	N.P.A.	Narrogin
Williams, Rex Geoffrey, A.F.A.I.M., J.P.	Lib.	Clontarf
Wilson, Hon. Keith James	A.L.P.	Nollamara

SUMMARY

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National Party of Australia (N.P.A.)	6
The Liberal Party of Australia (Western Australian Division) Incorporated (Lib.)	19

ELECTIONS

The Federal Parliament

General elections for the Federal Parliament were held on 11 July 1987. The Australian Labor Party, led by R.J.L. Hawke, A.C., was elected to office with a majority of fourteen seats in the House of Representatives.

Australian Labor Party representation in the Senate as a result of the elections decreased from thirty-five to thirty-two.

The State Parliament

At the conjoint election for the Legislative Council and the Legislative Assembly held on 18 February 1986, the Australian Labor Party, led by B.T. Burke, J.P., M.L.A., was elected to office with a majority in the Legislative Assembly of seven seats. Mr Burke retired as Premier on 25 February 1988. His successor is P.M'C Dowding, LL.B., M.L.A.

LEGISLATION DURING 1986

During the first session of the thirty-second Parliament, which lasted from 10 June 1986 to 4 December 1986, the Western Australian legislature enacted 109 Public Statutes and, in addition, dealt with twenty-five Bills which were introduced but not passed.

The full text of the legislation enacted is contained in the volumes of *The Acts of the Parliament of Western Australia*.

GOVERNMENT ADMINISTRATION

State Government

The Public Service of Western Australia operates under the provisions of the *Public Service Act 1978* and consists of a number of Departments established in accordance with the Act. These departments are detailed in Table 5.8. The establishment, abolition or alteration of Departments is subject to the approval of the Governor.

**TABLE 5.8 - WESTERN AUSTRALIAN
GOVERNMENT DEPARTMENTS
(Public Service Act 1978)**

<i>Department</i>	<i>Address</i>
Aboriginal Affairs Planning Authority	17 Emerald Terrace West Perth 6005
Department of Agriculture	Baron-Hay Court South Perth 6151
Department for the Arts	Perth Cultural Centre Stirling Street Perth 6000
Audit Department	Supply House 815 Hay Street Perth 6000
Building Management Authority of Western Australia	Dumas House 2 Havelock Street West Perth 6005
Department for Community Services	Royal Street East Perth 6000
Department of Computing and Information Technology	4th Floor May Holman Centre 32 St Georges's Tce Perth 6000
Department of Conservation and Land Management	Hackett Drive Crawley 6009
Ministry of Consumer Affairs	Willmar House 600 Murray Street Perth 6000
Corporate Affairs Department	Public Trust Office Building 565 Hay Street Perth 6000
Department of Corrective Services	441 Murray Street Perth 6000
Crown Law Department	Westpac Building 109 St George's Tce Perth 6000
Education Department	151 Royal Street East Perth 6000
Department of Employment and Training	18-20 Howard Street Perth 6000
Environmental Protection Authority	B.P. House 1 Mount Street Perth 6000
Department of Fisheries	108 Adelaide Tce Perth 6000
Government Employees Superannuation Board	10 Kings Park Road Perth 6000
Health Department of Western Australia	Curtin House 60 Beaufort Street Perth 6000
Authority for Intellectually Handicapped Persons	Irrabeena 53 Ord Street West Perth 6005
Department of Land Administration	Cathedral Avenue Perth 6000
Office of Executive Personnel	6th Floor Elder House 111 St George's Tce Perth 6000
Local Government Department	May Holman Centre 32 St George's Tce Perth 6000
Department of Marine and Harbours	Stateship Building 6 Short Street

**TABLE 5.8 - WESTERN AUSTRALIAN
GOVERNMENT DEPARTMENTS—continued
(Public Service Act 1978)**

<i>Department</i>	<i>Address</i>
	Fremantle 6160
Department of Mines	Mineral House 66 Adelaide Tce Perth 6000
Department of Occupational Health, Safety and Welfare	Willmar House 600 Murray Street Perth 6000
Police Department	2 Adelaide Tce Perth 6000
Ministry of the Premier and Cabinet	City Mutual Tower 197 St George's Tce Perth 6000
Public Service Commission	Elder National Mutual Centre 111 St George's Tce Perth 6000
Office of Racing and Gaming	Merlin Centre 3 Plain Street Perth 6000
Department of Regional Development and the North-West	12th Floor, May Holman Centre 32 St George's Tce Perth 6000
Department of Resources Development	Atrium Building 170 St George's Tce Perth 6000
Department of Services	3 Havelock Street West Perth 6005
Department for Sport and Recreation	PO Box 66 Wemmley 6014
State Government Insurance Commission	Atrium Building 170 St George's Tce Perth 6000
State Housing Commission	99 Plain Street East Perth 6000
State Planning Commission	Oakleigh Building 22 St George's Tce Perth 6000
State Taxation Department	Central Government Building Cnr St George's Tce and Barrack Street Perth 6000
Technology and Industry Development Authority	Atrium Building 170 St George's Tce Perth 6000
Department of Transport	68 St George's Tce Perth 6000
Treasury Department	City Mutual Tower 197 St George's Tce Perth 6000
Water Authority of Western Australia	John Tonkin Water Centre 629 Newcastle Street Leederville 6007
Workers' Compensation and Rehabilitation Commission	15 Rheola Street West Perth 6005
Western Australian Electoral Commission	480 Hay Street Perth 6000

Other parts of the State Public Service normally referred to as Statutory Authorities or Instrumentalities, function under separate Acts although they largely follow the conditions prescribed in the Public Service Act.

Australian Government

A comprehensive guide to the organisation and functions of the Australian Government is given in the *Commonwealth Government Directory*, including an outline of the activities of each Department of State together with similar information concerning Boards, Committees, Councils, Commissions and other Instrumentalities. A list of Australian Government Departments, the principal matters dealt with by each Department, and details of the statutes administered by the relevant Federal Minister are published from time to time in the *Commonwealth of Australia Gazette*.

THE JUDICATURE

The two major factors in the development of the Australian legal system have been its British origin and the Commonwealth Constitution of 1900. This Statute, an Act of the Imperial Parliament in London, limited the legislative power of State parliaments in some respects and created a federal legislature. Since 1942, however, the Imperial Parliament can legislate for Australia only at Australia's request. The sources of Australian law of today are, therefore, found in Commonwealth and State legislation, in some Imperial legislation, and in the common law. Independence of the judiciary is an essential part of the Australian legal system.

Table 5.9 lists members of the Western Australian judiciary as at 31 May 1988.

Particulars of these and other Western Australian courts, and Commonwealth courts appear in Chapters 9 and 21.

TABLE 5.9 - THE JUDICIARY

<i>Office</i>	<i>Name</i>
SUPREME COURT OF WESTERN AUSTRALIA	
Chief Justice	The Honourable D.K. Malcolm,
Senior Puisne Judge	The Honourable A.R.A. Wallace
Puisne Judges	The Honourable P.F. Brinsden The Honourable C.H. Smith The Honourable G.A. Kennedy The Honourable W.P. Pidgeon The Honourable B.W. Rowland The Honourable E.M. Franklyn The Honourable P.L. Seaman
Master	Mr G.T. Staples Mr K. White
THE DISTRICT COURT OF WESTERN AUSTRALIA	
Chief Judge	His Honour Judge D.C. Heenan
Judges	His Honour Judge I.R. Gunning His Honour Judge B.T. O'Dea His Honour Judge F.J. Whelan His Honour Judge K.J. Hammond His Honour Judge G.T. Sadleir His Honour Judge J.A. Samuel His Honour Judge N.H.S. Clarke Her Honour Judge A. Kennedy His Honour Judge P.J. Healy His Honour Judge H. Jackson His Honour Judge R. Keall His Honour Judge R. Viol His Honour Judge J. Barlow His Honour Judge P.J. Williams
THE FAMILY COURT OF WESTERN AUSTRALIA	
Chairman of Judges	The Honourable A.J. Barblett
Judges	His Honour Judge I.W.P. McCall His Honour Judge D.F. Connor His Honour Judge G.E.S. Ferrier His Honour Judge D.R. Anderson

STATE REPRESENTATION OVERSEAS AND IN OTHER STATES

Western Australia has been represented in the United Kingdom by an Agent General since 1892, the first appointment to the post being that of Sir Malcolm Fraser. An Office is maintained at Western Australia House, 115 Strand, London, W.C.2. Its functions include the representation of all Government Departments which have business in Britain and Europe, the purchase of government stores and equipment, the attraction of migrants, the encouragement of overseas private investment in Western Australia, and the provision of various types of assistance to visitors from Western Australia. In addition, the Office acts as agent for the State Treasury and as a receiving agency for The Rural and Industries Bank of Western Aus-

tralia. Western Australia's European Public Relations Office and its tourist officer for the United Kingdom and Europe also operate from Western Australia House. The Agent General for Western Australia, Mr R. Davies, is the personal representative in Britain of the State Premier.

The State is also represented in Japan, an Office being maintained by the Western Australian Government at Sankaido Building, 9-13 Akasaka, 1-CHOME, Minato-Ku 107, Tokyo.

The Western Australian Tourism Commission has travel centres in the Eastern States and overseas. Those offices are located at:

108 King William Street, Adelaide;

35 Elizabeth Street, Melbourne;

92 Pitt Street, Sydney;

Level 2, City Mutual Building, 307 Queen Street, Brisbane;

Western Australia House, 115 Strand, London W.C. 2, United Kingdom;

Unit 03-03, Thong Sia Building 30 Bideford Road, Singapore;

15th Floor, Quay Towers, 29 Customs Street West, Auckland, New Zealand;

2121 Avenue of the Stars, Suite 1210, Century City, Los Angeles, U.S.A.;

8th Floor, Sankaido Building, 9-13 Akasaka, 1-CHOME, Minato-Ku 107, Tokyo, Japan;

615 Swire House, 11 Chater Road, Hong Kong Central, Hong Kong;

6th Floor, UBN Tower Letterbox 51, 10 Jalan P Ramlee 50250, Kuala Lumpur, Malaysia.

Whilst primarily concerned with promoting and facilitating travel to Western Australia, travel centre managers also provide liaison on behalf of Government Departments which have business in these cities.

There are twenty-nine countries represented in Western Australia by a consular agent, vice-consul, consul, consul-general, or trade representative as listed in Table 5.10.

TABLE 5.10 - OVERSEAS REPRESENTATION IN
WESTERN AUSTRALIA

Country	Name and address of representative
Austria	T.A. Holmes, Honorary Consul, 8th Floor, 95 St George's Tce, Perth, W.A. 6000.
Belgium	Vacant.
Britain	S. Darling, Consul-General, 6th Floor, Prudential Building, 95 St George's Tce, Perth, W.A. 6000.
Denmark	P.J. Rasmussen, Honorary Consul, 19 Phillimore St, Fremantle, W.A. 6160.
Finland	R.C. Mattiske, Honorary Consul, 47 Allerton Way, Booragoon, W.A. 6154.
France	J. Kerr, Honorary Consul, 1st Floor, 201 Adelaide Tce, Perth, W.A. 6000.
Germany, Federal Republic of	A.E. Blankensee, Honorary Consul, 7th Floor, St George's Court, 16 St George's Tce, Perth, W.A. 6000.
Greece	A. Callidopoulos, Consul, St George's Court, 16 St George's Tce, Perth, W.A. 6000.
Honduras	E. Tapero de Newmann, Honorary Consul, 44 Troy Tce, Daglish, W.A. 6008.
Indonesia	R.C.H. Manser, Honorary Consul, 4 Judd St, South Perth, W.A. 6151.
Ireland	G.M. Nolan, Honorary Consul-General, 10 Lilika Rd, City Beach, W.A. 6015.
Italy	C. DiGesù, Consul, 31 Labouchere Rd, South Perth, W.A. 6151.
Japan	J. Aoki, O.B.E., Consul-General, 21st Floor, Forrest Centre, 221 St George's Tce Perth, W.A. 6000.
Malaysia	I. Bin Mohammed Rashdi, Consul, 4th Floor, Airways House, 195 Adelaide Tce, Perth, W.A. 6000.
Malta	Dr. A.V. Scibberras M.D., Honorary Consul, Bassendean Medical Centre, 1 Old Perth Rd, Bassendean, W.A. 6000.
Nepal	H.L. Roberts, Honorary Consul, 4th Floor, Airways Hotel Apartments, 195 Adelaide Tce, Perth, W.A. 6000.
Netherlands	T.C. Dercksen, Honorary Consul, The Mill Point Centre, Suite 4, 83 Mill Point Rd, South Perth, W.A. 6151.
New Zealand	D. Robertson, Consul,

TABLE 5.10 - OVERSEAS REPRESENTATION IN
WESTERN AUSTRALIA—continued

Country	Name and address of representative
	St George's Court, 16 St George's Tce, Perth, W.A. 6000.
Norway	P.G. Lynn, Honorary Consul, 11 Cliff St, Fremantle, W.A. 6160.
Pakistan	I.M. Parkes, Honorary Consul, 7 Kitchener Way, Victoria Park, W.A. 6100.
Philippines	R.C. Hemery, Honorary Consul-General, 12th Floor, 26 St George's Tce, Perth, W.A. 6000.
Portugal	J.M. Do Rosario E Silva, Honorary Consul, 18 High St, Fremantle, W.A. 6162.
Seychelles	G.F. Robert, Honorary Consul, 271 Canning Rd, Lesmurdie, W.A. 6076.
Spain	A. Quintela, Honorary Consul, AMP Building, 140 St George's Tce, Perth, W.A. 6000.
Sweden	H. Morgan, Honorary Consul, Laurens House, 849-51 Wellington St, Perth, W.A. 6000.
Switzerland	R.H. Abplanalp, Honorary Consul, 5 Marie Way, Kalamunda, W.A. 6076.
Thailand	Brigadier W.D. Jamieson, Honorary Consul-General, 135 Victoria Avenue, Dalkeith, W.A. 6009.
United States of America	W.H. Itoh, Consul-General, 9th Floor, 246 St George's Tce, Perth W.A. 6000.
Yugoslavia	V. Panov, Consul, 24 Colin St, West Perth, W.A. 6005.

THE LOCAL GOVERNMENT SYSTEM

The function of local government in Western Australia is performed by a number of Councils (or, in special circumstances, by Commissioners appointed by the Governor) exercising powers conferred by the Parliament of the State. Each of the Councils consists of members elected by a local community and is responsible for the provision of many of the services necessary for the organisation and welfare of the community which it represents.

Local government districts

On presentation of a petition signed by a prescribed minimum number of electors, the Governor may, by Order, constitute any part of the State as a Town; constitute as a

new Shire any part of an existing Shire; divide a Shire into two or more Shires; sever a portion of a district and annex the portion to an adjoining district, or constitute the portion as a new Town or Shire; divide a district into wards; or abolish a district and dissolve the local governing authority. In some cases the electors of a district have the right to demand that a poll be held on the question of boundary changes.

On the petition of the local authority concerned, the Governor may by Order declare to be a City any district which satisfies certain specified requirements. These requirements are that during the three years immediately preceeding the declaration, it shall have maintained a population of not less than 30,000 persons if situated in the metropolitan area as declared for the purposes of the Act, or not less than 20,000 persons if situated outside that area; and have maintained a gross revenue of \$200,000 for each of the three years. In addition the district must be clearly distinguishable as a centre of population having a distinct civic centre with adequate halls and cultural facilities, and must have sufficient residential, commercial, and industrial centres to justify its declaration as a separate city.

On 22 April 1988, the Town of Geraldton was declared a city. There are now sixteen cities, ten towns and 112 shires in Western Australia.

The *Local Government Act 1960* establishes a Local Government Boundaries Commission of three members. The Minister may refer to the Commission any question concerning the constitution or alteration of the constitution of local government districts. Every case where authorities are unable to agree on a matter of amalgamation or severance of territory must be referred to the Commission.

The boundaries of local government districts as they existed at 30 June 1987 are delineated on the maps of the State inside the back cover and the names and designations as at that date are given in the lists at the end of this Chapter.

Constitution and electoral provisions

The provisions of the Local Government Act relating to the composition of a Council require that the minimum number of mem-

bers be five with no limit set for the maximum number.

Provision is made for local government elections to be held on the first Saturday in May of each year but in specified circumstances the Governor may, by proclamation, appoint a Saturday in May, later than the first Saturday, to be the election date. Voting is not compulsory. Membership of a Council is elective in all cases, the qualified electors being adult Australian citizens, resident in the district and enrolled for the Legislative Assembly, or who own or occupy rateable land in the district. The preferential system of voting is used and representation is generally on the basis of wards into which the district may be divided. Each elector is entitled to one vote. Subject to disqualification on certain specified grounds, all electors, other than corporation nominees, are eligible for election to the Council of the district whether as Mayor, President or councillor.

The term of office of a Mayor or a President is three years if elected by the electors of the district, or one year if elected by the Council. Councillors are elected for a term of three years, as near as practicable to one-third of their number retiring each year. On the expiration of their term of office all members, including the Mayor and the President, are eligible for re-election if not subject to any of the disqualifications contained in the Act.

Functions of local authorities

The functions and powers of local authorities are extremely diverse in character. They are prescribed in detail in the Local Government Act and some of the more important of them are referred to in later Chapters of the Western Australian Year Book. For example, reference to local government activity in the fields of road construction and maintenance will be found in Chapter 23; the provision of parks, gardens and recreation grounds in Chapter 11; libraries in Chapter 11; public transport facilities in Chapter 19; water supplies in Chapter 12; and town planning and building control in Chapter 18. Among the many other powers of local authorities are those relating to hospitals and nursing services, kindergartens, hostels for school children, community centres, dental clinics, infant and maternal

health centres, day nurseries, control of dogs, jetties, swimming pools, sanitation and disposal of refuse, fire prevention, eradication of noxious weeds and vermin, aerodromes, abattoirs, quarries, pounds and cemeteries. Under the provisions of the Health Act local authorities are responsible for certain aspects of health administration.

Financial provisions

Local government authorities have four major sources of finance. They are moneys received from rates, loans, government grants and personal income tax entitlements. Financial powers of local authorities, although derived mainly from the Local Government Act, are also provided by other Statutes, including the Health Act, the Fire Brigades Act, the Cemeteries Act, and the Library Board of Western Australia Act.

Rates. The general rate for a local government district in any year is determined by dividing the sum required to make up the difference between anticipated expenditure and estimated revenue from sources other than rates for that year by the total value of rateable property in the district. However, a Council may impose a rate which would yield less than the amount required to balance its budget, subject to approval by the Minister. In assessing the value of rateable property, every local authority must adopt valuations made by the Valuer-General under the provisions of the *Valuation of Land Act 1979*. The *Land Valuation Tribunals Act 1978* provides for the constitution of Land Valuation Tribunals, to which appeals may be made on matters concerning valuations of property.

Valuations may be on the basis of either 'unimproved value' or 'gross rental value'. The unimproved value generally represents the price which the rated land might be expected to realise if sold on the open market and, as the term implies, excludes any improvements. The gross rental value is an estimate of the gross rental value of the property including improvements. Generally, City Councils and Town Councils are required to assess the general rate on the basis of gross rental value, and Shire Councils on unimproved value. Councils may charge a penalty on unpaid rates or offer a discount for early payment. The

prescribed maximum percentage for penalty or discount is 10 per cent.

Loans. Local authorities are authorised to raise loans for works and undertakings and for the liquidation of existing loan debts. A Council may, with the written consent of the Minister, obtain advances from a bank for a budget deficiency, for the installation of sewerage connections and septic tanks, and for other work approved by the Governor.

Certain of the works and undertakings for which loan moneys may be used are specified in the Local Government Act. They include the construction of streets, roads and bridges, sewers, drains and water works; the erection or purchase of electric lighting plant, gas works and stone quarries; the provision of hostels for school children, libraries and other recreational facilities; the construction of civic and other buildings; and the purchase of land, materials and equipment. Where a particular work or undertaking is not specified in the Act the Governor may approve of it as a project for which money may be borrowed.

Government grants. Government grants constitute an important source of revenue for local government authorities. These are mainly specific purpose payments for road works, further details of which are provided in Chapter 23.

Personal income tax entitlements. The *Local Government (Personal Income Tax Sharing) Act 1976* requires each State to allocate not less than 30 per cent of the funds among local government authorities on a population basis, but account may also be taken of the area of the authority, population density or any other matter agreed upon between the Commonwealth and the State. The remaining funds are to be allocated having regard to the special needs and disabilities of local authorities.

General. The financial transactions of local government authorities are subject to annual audit either by an auditor (or auditors) appointed by the Council or by the Auditor-General or persons appointed by him. To qualify for the office of auditor, a person must be a member of a specified institute or society of accountants and be registered as an auditor under the Companies Act. Appointment is for a term not exceeding two

years, at the end of which time the holder of the office is eligible for reappointment.

The financial year for all Councils ends on 30 June.

Details of the revenue and expenditure of local authorities during the three year period ending with the financial year 1985-86 are given in the section *Local Government Finance* in Chapter 23.

A more comprehensive description of the local government system is contained in Chapter 5 of the *Western Australian Year Book*, No. 24—1986.

STATISTICAL DIVISIONS

The local government districts are used as the basis of presentation of data derived not only from the population census but also from many of the regular statistical collections. Information presented in this way is valuable when considering activities in particular local government areas but is often more detailed than is required for a broader geographical assessment. For this reason, the local government districts are combined into statistical divisions which provide significant areas for the publication of statistics in a convenient summary form.

STATISTICAL DIVISIONS

with component Statistical Local Areas: at 30 June 1987

(Statistical divisions are indicated thus: *SOUTH-WEST*; sub-divisions thus: *BLACKWOOD*; statistical local areas thus: Manjimup (S). Cities are marked (C), Towns (T) and Shires (S)).

PERTH	SOUTH-WEST	Wagin (S)	Menzies (S)
CENTRAL	DALE	Wandering (S)	JOHNSTON
METROPOLITAN	Mandurah (S)	West Arthur (S)	Dundas (S)
Claremont (T)	Murray (S)	Wickepin (S)	Esperance (S)
Cottesloe (T)	Waroona (S)	Williams (S)	Ravensthorpe (S)
Mosman Park (T)	PRESTON	LAKES	CENTRAL
Nedlands (C)	Bunbury (C)	Corrigin (S)	GASCOYNE
Peppermint Grove (S)	Capel (S)	Kondinin (S)	Carnarvon (S)
Perth (C) - Inner	Collie (S)	Kulin (S)	Exmouth (S)
Perth (C) - North	Dardanup (S)	Lake Grace (S)	Shark Bay (S)
Perth (C) - Outer	Donnybrook-	MIDLANDS	Upper Gascoyne (S)
Perth (C) - South	Balingup (S)	MOORE	CARNEGIE
Perth (C) -	Harvey (S)	Chittering (S)	Cue (S)
Wembley-Coastal	VASSE	Dandaragan (S)	Meekatharra (S)
EAST	Augusta-Margaret	Gingin (S)	Mount Magnet (S)
METROPOLITAN	River (S)	Moorra (S)	Murchison (S)
Bassendean (T)	Busselton (S)	Victoria Plains (S)	Sandstone (S)
Bayswater (C)	BLACKWOOD	AVON	Wiluna (S)
Kalamunda (S)	Boyp Brook (S)	Beverley (S)	Yalgoo (S)
Mundaring (S)	Bridgetown-	Cunderdin (S)	GREENOUGH
Swan (S)	Greenbushes (S)	Dalwallinu (S)	RIVER
NORTH	Manjimup (S)	Dowerin (S)	Carnamah (S)
METROPOLITAN	Nannup (S)	Goomalling (S)	Chapman Valley (S)
Stirling (C) -	LOWER GREAT	Koorda (S)	Coorow (S)
Central	SOUTHERN	Northam (T)	Geraldton (T)
Stirling (C) - West	PALLINUP	Northam (S)	Greenough (S)
Stirling (C) -	Broomehill (S)	Quairading (S)	Irwin (S)
South-Eastern	Gnowangerup (S)	Tammin (S)	Mingenew (S)
Wanneroo (C)	Jerramungup (S)	Toodyay (S)	Morawa (S)
SOUTH-WEST	Katanning (S)	Wongan-Ballidu (S)	Mullewa (S)
METROPOLITAN	Kent (S)	Wyalkatchem (S)	Northampton (S)
Cockburn (C)	Kojunup (S)	York (S)	Perenjori (S)
East Fremantle (T)	Tambellup (S)	CAMPION	Three Springs (S)
Fremantle (C) -	Woodanilling (S)	Bruce Rock (S)	PILBARA
Inner	KING	Kellerberrin (S)	DE GREY
Fremantle (C) -	Albany (T)	Merredin (S)	East Pilbara (S)
Remainder	Albany (S)	Mount Marshall (S)	Port Hedland (S)
Kwinana (T)	Cranbrook (S)	Mukinbudin (S)	ASHBURTON
Melville (C)	Denmark (S)	Narembeen (S)	Roebourne (S)
Rockingham (S)	Plantagenet (S)	Nungarin (S)	West Pilbara (S)
SOUTH-EAST	UPPER GREAT	Trayning (S)	KIMBERLEY
METROPOLITAN	SOUTHERN	Westonia (S)	ORD
Armadale (C)	HOTHAM	Yilgarn (S)	Halls Creek (S)
Belmont (C)	Boddington (S)	SOUTH-EASTERN	Wyndham-East
Canning (C)	Brookton (S)	LEFROY	Kimberley (S)
Gosnells (C)	Cuballing (S)	Boulder (S)	FITZROY
Serpentine-	Dumbleyung (S)	Coolgardie (S)	Broome (S)
Jarrahdale (S)	Narrogin (T)	Kalgoorlie (T)	Derby-West
South Perth (C)	Narrogin (S)	Laverton (S)	Kimberley (S)
	Pingelly (S)	Leonora (S)	

LIST OF LOCAL GOVERNMENT AREAS
At 30 June 1987

<i>Local government area (a)</i>	<i>Statistical division in which situated</i>	<i>Local government area (a)</i>	<i>Statistical division in which situated</i>
ALBANY (T)	Lower Great Southern	Laverton	South-Eastern
Albany	Lower Great Southern	Leonora	South-Eastern
ARMADALE (C)	Perth	Mandurah	South-West
Augusta-Margaret River	South-West	Manjimup	South-West
BASSENDAN (T)	Perth	Meekatharra	Central
BAYSWATER (C)	Perth	MELVILLE (C)	Perth
BELMONT (C)	Perth	Menzies	South-Eastern
Beverley	Midlands	Merredin	Midlands
Boddington	Upper Great Southern	Mingenew	Central
Boulder	South-Eastern	Moora	Midlands
Boyup Brook	South-West	Morawa	Central
Bridgetown-Greenbushes	South-West	MOSMAN PARK (T)	Perth
Brookton	Upper Great Southern	Mount Magnet	Central
Broome	Kimberley	Mount Marshall	Midlands
Broomehill	Lower Great Southern	Mukinbudin	Midlands
Bruce Rock	Midlands	Mullewa	Central
BUNBURY (C)	South-West	Mundaring	Perth
Busselton	South-West	Murchison	Central
CANNING (C)	Perth	Murray	South-West
Capel	South-West	Nannup	South-West
Carnamah	Central	Narembeen	Midlands
Carnarvon	Central	NARROGIN (T)	Upper Great Southern
Chapman Valley	Central	Narrogin	Upper Great Southern
Chittering	Midlands	NEDLANDS (C)	Perth
CLAREMONT (T)	Perth	NORTHAM (T)	Midlands
COCKBURN (C)	Perth	Northam	Midlands
Collie	South-West	Northampton	Central
Coolgardie	South-Eastern	Nungarin	Midlands
Coorow	Central	Peppermint Grove	Perth
Corrigin	Upper Great Southern	Perenjori	Central
COTTESLOE (T)	Perth	PERTH (C)	Perth
Cranbrook	Lower Great Southern	Pingelly	Upper Great Southern
Cuballing	Upper Great Southern	Plantagenet	Lower Great Southern
Cue	Central	Port Hedland	Pilbara
Cunderdin	Midlands	Quairading	Midlands
Dalwallinu	Midlands	Ravensthorpe	South-Eastern
Dandaragan	Midlands	Rockingham	Perth
Dardanup	South-West	Roebourne	Pilbara
Denmark	Lower Great Southern	Sandstone	Central
Derby-West Kimberley	Kimberley	Serpentine-Jarrahdale	Perth
Donnybrook-Balingup	South-West	Shark Bay	Central
Dowerin	Midlands	SOUTH PERTH (C)	Perth
Dumbleyung	Upper Great Southern	STIRLING (C)	Perth
Dundas	South-Eastern	SUBIACO (C)	Perth
EAST FREMANTLE (T)	Perth	Swan	Perth
East Pilbara	Pilbara	Tambellup	Lower Great Southern
Esperance	South-Eastern	Tammin	Midlands
Exmouth	Central	Three Springs	Central
FREMANTLE (C)	Perth	Toodyay	Midlands
GERALDTON (T)	Central	Trayning	Midlands
Gingin	Midlands	Upper Gascoyne	Central
Gnowangerup	Lower Great Southern	Victoria Plains	Midlands
Goomalling	Midlands	Wagin	Upper Great Southern
GOSNELLS (C)	Perth	Wandering	Upper Great Southern
Greenough	Central	WANNEROO (C)	Perth
Halls Creek	Kimberley	Warooka	South-West
Harvey	South-West	West Arthur	Upper Great Southern
Irwin	Central	West Pilbara	Pilbara
Jerramungup	Lower Great Southern	Westonia	Midlands
Kalamunda	Perth	Wickepin	Upper Great Southern
KALGOORLIE (T)	South-Eastern	Williams	Upper Great Southern
Katanning	Lower Great Southern	Wiluna	Central
Kellerberrin	Midlands	Wongan-Ballidu	Midlands
Kent	Lower Great Southern	Woodanilling	Lower Great Southern
Kojonup	Lower Great Southern	Wyalkatchem	Midlands
Kondinin	Upper Great Southern	Wyndham-East Kimberley	Kimberley
Koorda	Midlands	Yalgoo	Central
Kulin	Upper Great Southern	Yilgarn	Midlands
KWINANA (T)	Perth	York	Midlands
Lake Grace	Upper Great Southern		

(a) Shire, unless marked (C) indicating City, or (T) indicating Town.

Chapter 6

POPULATION AND VITAL STATISTICS

Population

The State of Western Australia, although comprising almost one-third of the total area of Australia, contains only about one-eleventh of the population.

At the end of 1829, the year of establishment of the Colony, there were 1,000 non-Aboriginal persons in Western Australia. Estimates of the number of Aborigines in the State at colonisation vary. In the *Western Australian Year Book*, No. 22—1984, Chapter 1, it is noted that 'There has, therefore, been some consensus that the population prior to European settlement was in the 50,000 to 60,000 bracket.' Progress in the early years was slow, and in 1849 the population was still less than 5,000. Transportation of convicts, begun in the following year, resulted in some acceleration, but it was not until the discovery of gold in the Kimberley in 1885 and the rich finds at Coolgardie in 1892 and at Kalgoorlie in 1893 that any marked increase took place. This development was so rapid that, in the last decade of the century, the non-Aboriginal population was almost quadrupled, from 48,500 at the end of 1890 to 180,000 in 1900, representing an average annual rate of increase of 14.01 per cent. The rate of growth in those years has never been approached in the present century, but the average annual rate of increase of Western Australia's population from the Census of 1901 to June 1986, 2.46 per cent, has been higher than that of any other State and of Australia as a whole (1.71 per cent).

In the decade from 30 June 1976 to 30 June 1986 the State's annual rate of increase has

been 2.16 per cent compared with a national figure of 1.33 per cent.

TABLE 6.1 - POPULATION OF WESTERN AUSTRALIA AND AUSTRALIA (a)

Year ended 30 June	Western Australia				
	Western Australia (Persons)	Australia (Persons)	Proportion of Australia (per cent)	Masculinity ratio (b)	Annual average growth rate (per cent)
1971 (c)	1,053,834	13,067,265	8.06	104.83	6.30
1976 (c)	1,178,342	14,033,083	8.40	103.73	2.03
1981 (c)	1,300,056	14,923,260	8.71	102.25	2.44
1984	1,391,237	15,579,391	8.93	101.99	1.62
1985	1,418,564	15,788,312	8.98	101.81	1.96
1986 (c)	1,459,019	16,018,350	9.11	101.83	2.85

(a) Estimated resident population. (b) Number of males per 100 females. (c) Census date.

ESTIMATES OF POPULATION

The conceptual basis for population estimation in Australia changed in June 1981. Estimates since this date, together with revisions back to June 1971, have been made on the basis of the State of usual residence of persons. Census date estimates are derived by adjusting census count, place of usual residence data for under enumera-

tion and adding residents who are temporarily overseas on census night.

For dates other than those of the periodic censuses of population, estimates are based on records of births and deaths and movements of population interstate and overseas. Estimates of the population of Australia and of each of the States and Territories are prepared by the Australian Statistician as at

31 March, 30 June, 30 September and 31 December in each year. Because the available records of interstate movement are incomplete, these intercensal estimates as they apply to States and Territories are approximate and are revised when the results of the next census become known.

Further information on estimated resident population is contained in the publication *Population Estimates: An outline of the New Conceptual Basis of ABS Population Estimates* (Catalogue No. 3216.0) issued by the Australian Statistician, Canberra.

MEAN POPULATION

It is often useful to relate a given characteristic to population in order to express it in per capita terms or as 'per head of population.' Mean population is used for this purpose. The formula to calculate mean population is

$$1/12 (a + 4b + 2c + 4d + e)$$

where *a* represents the population at the beginning of the year and *b*, *c*, *d* and *e* the populations at the end of the first, second, third and fourth quarters respectively.

DIAGRAM 6.1
ESTIMATED RESIDENT POPULATION
AGE LAST BIRTHDAY, BY SEX, 30 JUNE 1981 AND 1986

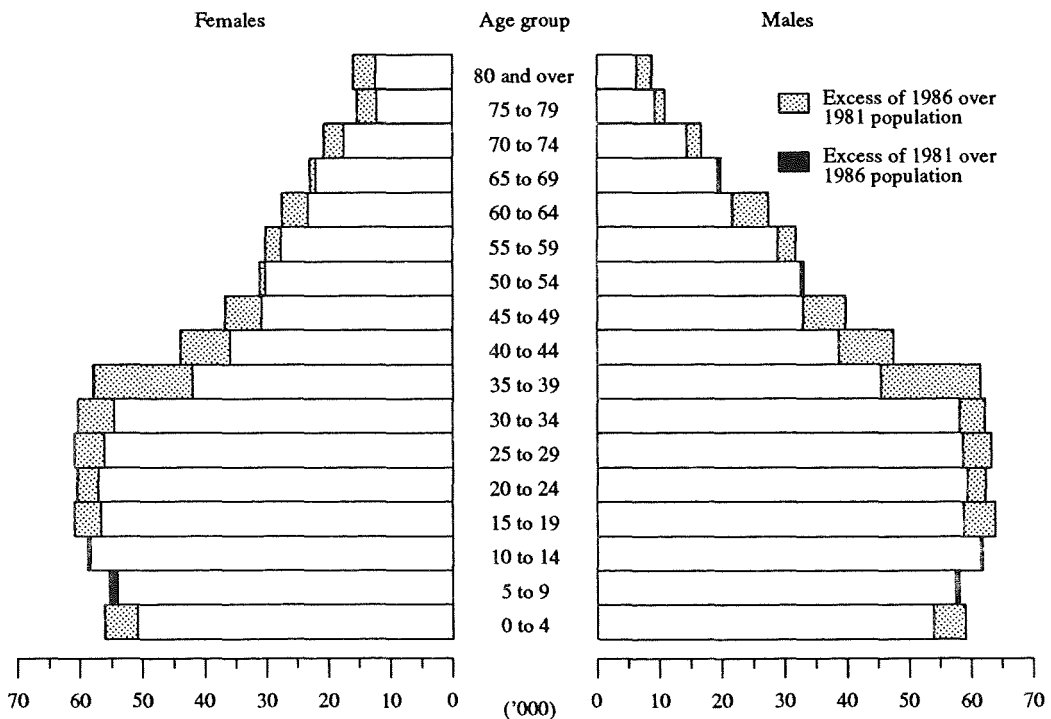


TABLE 6.2 - ESTIMATED RESIDENT POPULATION
(⁰⁰⁰)

Year	Population at end of year			Increase during year			Mean population		
	Males	Females	Persons	Natural increase (a)	Estimated net migration (b)	Estimated total increase (c)	Males	Females	Persons
YEAR ENDED 30 JUNE									
1981	657.2	642.8	1,300.1	12.9	17.0	31.0	649.2	634.8	1,284.0
1985	715.6	702.9	1,418.6	14.2	9.8	27.3	708.6	695.4	1,404.1
1986	636.1	722.9	1,459.0	14.3	22.5	30.5	725.2	712.3	1,437.5
YEAR ENDED 31 DECEMBER									
1981	666.7	652.2	1,319.0	13.9	21.1	36.7	657.9	643.3	1,301.2
1985	725.0	711.9	1,436.9	14.3	16.3	33.9	716.0	703.0	1,419.0
1986	745.3	732.4	1,477.7	14.9	23.8	40.8	735.5	722.5	1,458.0

(a) Excess of births registered over deaths registered by State of usual residence. (b) Interstate and overseas. (c) Differences between the sum of natural increase and net migration, and total increase are due to distribution of the intercensal discrepancy.

POPULATION IN STATISTICAL LOCAL AREAS

Table 6.3 shows the estimated resident population in statistical local areas. The names and designations are as they existed at 30 June 1986. The Cities of Fremantle, Perth and Stirling are comprised of a number of statistical local areas but estimates for these have not been separately compiled for 1981. Statistical local areas are marked (C) for City, (T) for Town or (S) for Shire.

TABLE 6.3 - ESTIMATED RESIDENT POPULATION IN
STATISTICAL LOCAL AREAS
(persons)

Statistical local area	At 30 June	
	1981(a)	1986(a)
Albany (S)	7,854	8,579
Albany (T)	13,764	14,651
Armadale (C)	37,152	43,754
Augusta-Margaret River (S)	4,000	5,033
Bassendean (T)	12,185	13,555
Bayswater (C)	39,748	43,901
Belmont (C)	30,389	29,482
Beverley (S)	1,554	1,502
Boddington (S)	778	911
Boulder (S)	11,447	13,225
Boyup Brook (S)	2,002	1,859
Bridgetown-Greenbushes (S)	3,292	3,536
Brookton (S)	1,214	1,093
Broome (S)	4,275	6,253
Broomehill (S)	619	608
Bruce Rock (S)	1,410	1,298
Bunbury (C)	22,445	24,731
Busselton (S)	9,808	11,933

TABLE 6.3 - ESTIMATED RESIDENT POPULATION IN
STATISTICAL LOCAL AREAS — *continued*
(persons)

Statistical local area	At 30 June	
	1981(a)	1986(a)
Canning (C)	54,556	64,406
Capel (S)	2,963	3,983
Carnamah (S)	1,245	1,418
Carnarvon (S)	6,581	7,439
Chapman Valley (S)	852	771
Chittering (S)	1,210	1,409
Claremont (T)	8,477	8,560
Cockburn (C)	32,547	41,916
Collie (S)	9,064	9,674
Coolgardie (S)	5,682	5,190
Coorow (S)	1,253	1,393
Corrigin (S)	1,620	1,450
Cottesloe (T)	6,949	7,266
Cranbrook (S)	1,336	1,265
Cuballing (S)	680	636
Cue (S)	339	544
Cunderdin (S)	1,630	1,484
Dalwallinu (S)	1,901	1,779
Dandaragan (S)	1,785	2,128
Dardanup (S)	3,608	4,442
Denmark (S)	2,293	2,757
Derby-West Kimberley (S)	6,328	6,846
Donnybrook-Balingup (S)	3,380	3,763
Dowerin (S)	998	961
Dumbleyung (S)	1,009	1,021
Dundas (S)	2,334	2,275
East Fremantle (T)	6,331	6,026
East Pilbara (S)	9,847	9,553
Esperance (S)	9,637	9,906
Exmouth (S)	2,175	2,398
Fremantle (C) (b)	23,061	23,540
Inner	n.a.	683
Remainder	n.a.	22,857
Geraldton (T)	19,096	19,923
Gingin (S)	1,875	2,589
Gnowangerup (S) (c)	3,633	2,197
Goomalling (S)	1,269	1,206
Gosnells (C)	53,995	63,805
Greenough (S)	4,612	5,798

TABLE 6.3 - ESTIMATED RESIDENT POPULATION IN STATISTICAL LOCAL AREAS — *continued* (persons)

Statistical local area	At 30 June	
	1981(a)	1986(a)
Halls Creek (S)	2,538	2,855
Harvey (S)	8,305	10,332
Irwin (S)	1,578	1,805
Jerramungup (S)	(c)	1,356
Kalamunda (S)	36,354	43,517
Kalgoorlie (T)	9,465	10,973
Katanning (S)	5,096	4,884
Kellerberrin (S)	1,663	1,436
Kent (S)	1,014	981
Kojonup (S)	2,734	2,479
Kondinin (S)	1,282	1,180
Koorda (S)	791	690
Kulin (S)	1,275	1,162
Kwinana (T)	13,998	14,838
Lake Grace (S)	2,043	2,151
Laverton (S)	1,087	1,358
Leonora (S)	1,896	2,265
Mandurah (S)	13,525	19,196
Manjimup (S)	9,403	9,582
Meekatharra (S)	1,216	1,416
Melville (C)	63,006	72,271
Menzies (S)	351	300
Merredin (S)	4,525	4,177
Mingenew (S)	736	693
Moora (S)	3,102	2,828
Morawa (S)	1,290	1,165
Mosman Park (T)	7,235	7,434
Mount Magnet (S)	770	1,167
Mount Marshall (S)	920	877
Mukinbudin (S)	884	855
Mullewa (S)	1,648	1,455
Mundaring (S)	21,304	26,069
Murchison (S)	170	132
Murray (S)	6,580	6,980
Nannup (S)	1,061	1,132
Narembeen (S)	1,335	1,180
Narrogin (S)	813	680
Narrogin (T)	5,146	5,043
Nedlands (C)	20,350	19,857
Northam (S)	2,589	2,451
Northam (T)	6,944	6,887
Northampton (S)	2,366	3,034
Nungarin (S)	347	313
Peppermint Grove (S)	1,614	1,587
Perenjori (S)	1,005	823
Perth (C) (b)	79,997	81,491
Inner	n.a.	922
North	n.a.	21,383
Outer	n.a.	14,532
South	n.a.	24,543
Wembley-Coastal	n.a.	20,111
Pingelly (S)	1,410	1,371
Plantagenet (S)	4,274	4,201
Port Hedland (S)	13,381	13,426
Quairading (S)	1,300	1,243
Ravensthorpe (S)	1,356	1,409
Rockingham (S)	25,545	32,845
Roebourne (S)	14,668	16,572
Sandstone (S)	132	127
Serpentine-Jarrahdale (S)	5,071	6,523
Shark Bay (S)	629	1,081
South Perth (C)	32,186	34,307
Stirling (C) (b)	167,077	174,902
Central	n.a.	98,767
West	n.a.	54,855

TABLE 6.3 - ESTIMATED RESIDENT POPULATION IN STATISTICAL LOCAL AREAS — *continued* (persons)

Statistical local area	At 30 June	
	1981(a)	1986(a)
South-Eastern	n.a.	21,280
Subiaco (C)	14,160	15,424
Swan (S)	32,412	39,150
Tambellup (S)	976	849
Tammin (S)	585	550
Three Springs (S)	1,081	1,022
Toodyay (S)	1,450	1,831
Trayning (S)	617	565
Upper Gascoyne (S)	213	244
Victoria Plains (S)	1,332	1,243
Wagin (S)	2,397	2,206
Wandering (S)	487	402
Wanneroo (C)	96,338	133,924
Waroona (S)	2,462	2,585
West Arthur (S)	1,288	1,118
West Pilbara (S)	8,752	8,800
Westonia (S)	453	484
Wickepin (S)	1,018	951
Williams (S)	1,174	1,146
Wiluna (S)	1,521	1,801
Wongan-Ballidu (S)	2,087	1,922
Woodanilling (S)	461	435
Wyalkatchem (S)	954	786
Wyndham-East Kimberley (S)	4,794	6,049
Yalgoo (S)	291	270
Yilgarn (S)	2,148	2,039
York (S)	2,133	2,258
Total	1,300,056	1,459,019

(a) Census date. (b) Cities of Fremantle, Perth and Stirling are comprised of a number of statistical local areas. (c) Shire of Gnowangerup was split to form the shires of Gnowangerup and Jerramungup on 1 July 1982.

CHARACTERISTICS OF THE POPULATION

Age. Table 6.4 shows the numbers and proportions of the population of Western Australia in selected age groups at 30 June 1981, 1985 and 1986. The age groups have been chosen as representing, in a general sense, such sectors as the pre-school population, children of school age, minors, the economically active population and those beyond normal working age.

Religion and birthplace. The religion and birthplace of the population as recorded at the censuses of 1976, 1981 and 1986 are shown in Tables 6.5 and 6.6. The *Census and Statistics Act 1905* provides that there shall be no penalty for failure to answer the question on religion, and a statement to this effect is contained in the census schedule.

TABLE 6.4 - POPULATION IN SELECTED AGE GROUPS (a)
(persons)

Age last birthday (years)	Number in each age group			Per cent of total		
	At 30 June			At 30 June		
	1981 (b)	1985	1986 (b)	1981 (b)	1985	1986 (b)
Under 6	126,105	135,428	139,386	9.70	9.55	9.55
6 - 12	166,126	159,561	159,596	12.78	11.25	10.94
6 - 15	234,663	237,738	238,139	18.05	16.76	16.32
Under 18	430,211	422,059	427,954	33.09	29.75	29.33
Under 21	500,662	492,182	499,402	38.51	34.70	34.23
15 - 44	621,087	687,915	713,068	47.77	48.49	48.87
15 - 64	848,697	942,471	974,768	65.28	66.44	66.81
65 and over	113,143	127,965	134,014	8.70	9.02	9.19
All ages	1,300,056	1,418,564	1,459,019	100.00	100.00	100.00

(a) Estimated resident population. (b) Census date.

TABLE 6.5 - RELIGION OF THE POPULATION (a)
(⁰000 persons)

Religion	Census 30 June		
	1976	1981	1986
Christian—			
Anglican	360.3	375.8	371.3
Baptist	14.4	15.9	16.9
Catholic	283.2	316.3	347.7
Churches of Christ	12.6	14.2	14.4
Methodist	77.0	51.2	(b)
Presbyterian	42.6	32.0	31.6
Uniting	(b)	(b)	82.9
Other	85.0	131.6	113.3
Total Christian	875.2	937.1	978.0
Non-Christian—			
Buddhist	(c)	(c)	7.2
Hebrew	2.9	3.2	3.9
Muslim	1.9	3.6	5.5
Other	3.3	4.9	6.4
Total Non-Christian	8.1	11.6	23.0
Non-classifiable	5.5	8.0	6.0
No religious denomination	119.5	172.1	235.3
Not stated	136.6	144.8	164.3
Total	1,144.9	1,273.6	1,406.9

(a) Figures as counted. (b) The Uniting Church in Australia, which was formed in June 1977 by the union of all the Methodist Churches and most of the Congregational and Presbyterian Churches, replaced the Methodist Church as a major category in the 1986 Census. (c) Included in Other, Non-Christian.

TABLE 6.6 - BIRTHPLACE OF THE POPULATION (a)
(⁰000 persons) — continued

Birthplace	Census 30 June		
	1976	1981	1986
Asia—			
India	9.9	10.1	10.6
Malaysia	4.0	5.4	8.7
Vietnam	-	2.8	5.9
Burma	4.0	4.4	4.5
Singapore	2.5	3.4	4.7
Other	8.9	11.4	16.0
Total Asia	29.3	37.6	50.5
Oceania—			
New Zealand	8.9	18.5	25.2
Other	1.1	1.6	3.4
Total Oceania	9.9	20.0	28.6
Africa—			
Republic of South Africa	2.3	4.2	6.3
Other	5.2	7.2	9.1
Total Africa	7.6	11.4	15.4
America—			
United States of America	3.6	4.1	5.1
Other	3.4	4.4	5.1
Total America	7.1	8.5	10.1
Total (b)	1,144.9	1,273.6	1,406.9

(a) Figures as counted. (b) Includes those born at sea and not stated.

TABLE 6.6 - BIRTHPLACE OF THE POPULATION (a)
(⁰000 persons)

Birthplace	Census 30 June		
	1976	1981	1986
Australia	832.4	911.0	997.8
Europe—			
United Kingdom and Eire	176.6	186.1	194.0
Italy	29.3	29.2	27.8
Netherlands	10.6	11.3	11.6
Yugoslavia	10.4	11.0	11.2
Germany	7.4	8.1	9.5
Poland	4.4	5.0	6.5
Greece	4.5	4.3	4.0
Other	15.3	15.8	17.3
Total Europe	258.6	270.9	281.8

Aboriginals and Torres Strait Islanders

The 1986 Census of Population and Housing counted 37,789 Aboriginals and Torres Strait Islanders in Western Australia compared to 31,351 in 1981. The 1986 figure represented 2.7 per cent of all persons counted in the State.

Table 6.7 shows the age distribution of Aboriginals and Torres Strait Islanders at 30 June 1976, 1981 and 1986. At 30 June 1986 nearly 63 per cent were less than 25 years of age and 3.5 per cent were 65 years of age or older. Equivalent figures for the total State population were 41.2 per cent and 9.3 per cent respectively. There were relatively

less Aboriginals and Torres Strait Islanders in each age group above 20-24 years than for the total State population.

Most Aboriginals and Torres Strait Islanders, 22,605 or 60 per cent of the total in Western Australia, were located in urban centres at 30 June 1986. The principal urban and remote community population centres in which Aboriginals and Torres Strait Islanders were counted in the 1986 Census are shown in Table 6.8.

TABLE 6.7 - AGE DISTRIBUTION: ABORIGINALS AND TORRES STRAIT ISLANDERS (persons)

Age last birthday (years)	Census 30 June		
	1976	1981	1986
0 - 4	3,890	4,108	5,349
5 - 9	4,146	4,580	4,702
10 - 14	3,823	4,616	4,866
15 - 19	3,006	3,827	4,712
20 - 24	2,298	3,089	4,098
25 - 29	1,836	2,367	3,182
30 - 34	1,347	1,772	2,472
35 - 39	1,157	1,421	1,933
40 - 44	1,029	1,259	1,499
45 - 49	885	1,099	1,193
50 - 54	657	910	1,025
55 - 59	501	575	800
60 - 64	457	590	615
65 - 69	479	478	523
70	612	666	818
Total	26,126	31,351	37,789

TABLE 6.8 - ABORIGINALS AND TORRES STRAIT ISLANDERS: MAJOR POPULATION CENTRES CENSUS 30 JUNE 1986

Locality	Persons
URBAN CENTRES	
Albany	377
Broome	1,359
Bunbury	590
Carnarvon	878
Derby	946
Fitzroy Crossing	662
Geraldton	1,290
Halls Creek	719
Kalgoorlie-Boulder	929
Kununurra	748
Kwinana	354
Meekatharra	373
Mullewa	318
Northam	301
Perth	8,830
Port Hedland	1,407
Roebourne	597
Wyndham	539
REMOTE AREA COMMUNITIES	
Balgo	443
Beagle Bay	241
Billiluna/Lake Gregory	256
Central Reserves	629
Gogo	259
Jigalong	353
La Grange	410
Looma	207
One Arm Point/Lombardina	413
Turkey Creek	258
Warburton	361

Vital Statistics

Registration of births, deaths and marriages in Western Australia is compulsory. Particulars reported to District Registrars are sent to the Registrar-General at Perth, where a central registry is maintained. Local registers are kept at each district office.

Births are required to be registered within sixty days of the event, and a fetal death (stillbirth) must be registered both as a birth and a death. Deaths are required to be registered within fourteen days. Marriage certificates must be lodged for registration within fourteen days of the date of marriage.

Statistics of births, deaths and marriages are prepared from registration documents.

BIRTHS

Table 6.9 provides details of live births in Western Australia for the years 1981, 1985 and 1986. The proportions of each sex born in 1981 and 1986 were relatively constant, although the percentage of males born in 1985 was lower than in the other two years. Total births as a percentage of Mean Resident Population has remained relatively stable, 1.68 in 1981, 1.63 in 1985 and 1.66 in 1986. The proportion of births that are ex-nuptial has increased over the period shown.

TABLE 6.9 - BIRTHS REGISTERED (a)

Particulars	1981	1985	1986
Births (b)—			
Males	11,342	11,775	12,448
Females	10,535	11,334	11,788
Persons	21,877	23,109	24,236
Ex-nuptial	3,300	3,886	4,481
Proportion of total persons (per cent)	15.1	16.8	18.5

(a) Figures for 1981 are based on State of registration. Figures for 1985 and 1986 relate to State of usual residence of mother. (b) Includes ex-nuptial births.

Table 6.10 shows total and ex-nuptial births registered according to age of mother. The figures show an overall decrease in the proportion of both total and ex-nuptial births to mothers under the age of 24 years, and an increase in the proportion of births to mothers in the age groups from 25 to 39 years. The most significant increase has been in ex-nuptial births to mothers in the 25-29 year age group. The proportion of ex-nuptial births to mothers in the under 24 years age groups is consistently higher than the proportion of total births to mothers in the same age groups. In the 25-29, 30-34 and 35-39 year age groups the situation is reversed.

TABLE 6.10 - BIRTHS REGISTERED (a): AGE OF MOTHER

Age of mother (years)	1986		
	1981	1985	Per cent of total
TOTAL BIRTHS (b)			
Under 20	1,716	1,380	6.2
20 - 24	6,653	6,132	25.2
25 - 29	8,285	9,029	39.1
30 - 34	4,106	4,989	22.2
35 - 39	946	1,400	6.6
40 - 44	165	171	0.7
45 and over	6	5	(c)
Not stated	-	3	(c)
Total	21,877	23,109	100.0
EX-NUPTIAL BIRTHS			
Under 20	1,050	996	25.2
20 - 24	1,189	1,447	35.7
25 - 29	629	908	22.8
30 - 34	298	384	11.8
35 - 39	105	130	3.7
40 - 44	26	18	0.7
45 and over	3	-	0.1
Not stated	-	3	0.1
Total	3,300	3,886	100.0

(a) Figures for 1981 are based on State of registration. Figures for 1985 and 1986 relate to State of usual residence of mother. (b) Includes ex-nuptial births. (c) Less than 0.05.

Ex-nuptial live births. A birth is registered as ex-nuptial if the parents are not married to

each other at the time of the confinement. Ex-nuptial births in 1986 comprised 18.5 per cent of all live births registered.

Legitimations. Under the provisions of the *Marriage Act 1961* (Commonwealth) which came into operation on 1 September 1963, a child whose parents are not married to each other at the time of its birth becomes legitimised on the subsequent marriage of its parents. The legitimisation takes place whether or not there was a legal impediment to the marriage of the parents at the time of the child's birth, and whether or not the child was still living at the time of the marriage, or in the case of a child born before 1 September 1963, at that date.

Age-specific birth rates. As a measure of fertility, the crude birth rate has the advantage of simplicity in calculation. The data necessary for its computation are usually readily available from published statistics, and it is therefore useful in comparing the fertility of the populations of States and countries for which no additional data are available. However, it is of limited use since it does not take into account the important factors of age and sex composition of the population. Age-specific birth rates, which do have regard to these factors, therefore provide a better measure of fertility. Age-specific birth rates represent the number of births to women of specified ages per thousand women of those particular ages, and thus take cognisance of the variations in fertility experienced by women at the successive stages of their child-bearing life.

Gross and net reproduction rates. The gross reproduction rate is derived from fertility rates representing the number of female births to women of specified ages per thousand women of those particular ages. It provides a measure of the number of female children who would be born, on the average, to every woman assuming that she lives through the whole of the child-bearing period and that the basic fertility rates remain unaltered throughout.

The gross reproduction rate assumes that all females survive to the end of their child-bearing capacity. A more accurate measure, which takes into account the effect of mortality among women during this period, is the net reproduction rate. This rate represents the average number of female children who would be born to women

during their lifetime if they were subject in each succeeding year of life to the fertility and mortality rates on which the calculation is based. The net reproduction rate is a measure of the number of women who, in the next generation, will replace the women of reproductive age in the current generation. It provides a useful indication of likely future population trends. A rate remaining stationary at unity indicates an ultimately static population. If a rate greater than unity is maintained, an ultimate increase of population will result, while a continuing rate less than unity will lead to an ultimate decline.

TABLE 6.11 - BIRTHS, WESTERN AUSTRALIA IN RELATION TO AUSTRALIA, 1986

Particulars	Western Australia	Australia
Number of births—		
Nuptial	19,755	202,458
Ex-nuptial	4,481	40,950
Total	24,236	243,408
Crude birth rate (a)	16.6	15.2
Age-specific birth rate (b)—		
15 - 19	24.6	21.8
20 - 24	100.2	90.0
25 - 29	151.6	141.9
30 - 34	88.3	88.7
35 - 39	27.1	27.2
40 - 44	3.9	4.3
45 - 49	0.2	0.2
Gross reproduction rate (c)	0.963	0.910
Net reproduction rate (d)	0.947	0.895

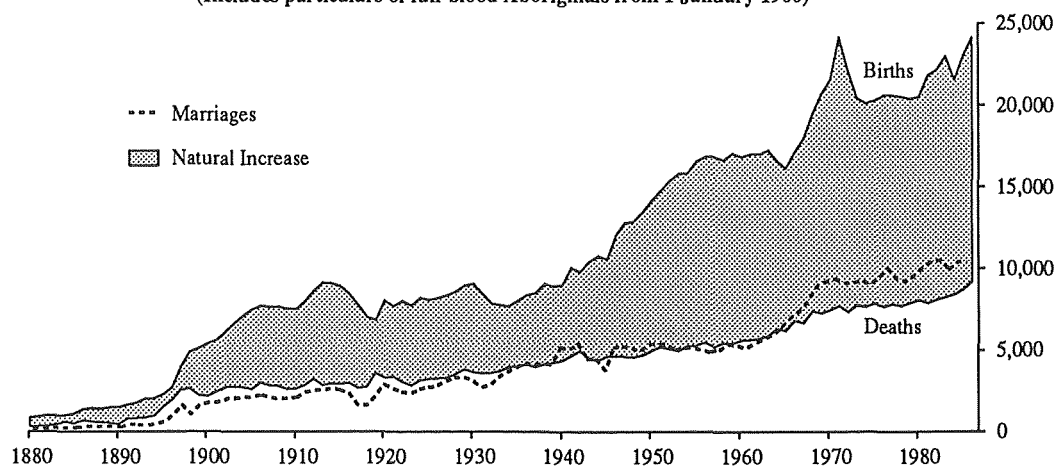
(a) Per 1,000 mean resident population. (b) Live births per 1,000 women in each age group. Births to mothers under 15 are included in the 15 - 19 age group, and births to mothers aged 50 and over are included in the 45 - 49 age group. (c) Sum of the female age-specific fertility rates multiplied by 5 and divided by 1,000. (d) Based on annual life tables calculated by the Australian Statistician. Because of the method of calculation, these figures are subject to annual fluctuations which may not be indicative of a longer term trend.

Table 6.11 provides comparative data for Western Australia and Australia on number of births, birth rates and reproduction rates for 1986. The figures show that the crude birth rate (the number of total births per thousand mean resident population) for Western Australia (16.6 per cent) is higher than for Australia as a whole (15.2 per cent). The percentage of ex-nuptial to total births in Western Australia is also higher (18.5 per cent) than the figure for Australia (16.8 per cent).

DEATHS

Causes of death. Statistics of causes of death provide important numerical facts by which to evaluate the varying health conditions and needs of different countries. The figures in Table 6.12 and 6.13 have been compiled on the basis of the *International Statistical*

DIAGRAM 6.2
BIRTHS, DEATHS AND MARRIAGES, 1880 to 1986
(Includes particulars of full-blood Aborigines from 1 January 1966)



Classification of Diseases, Injuries and Causes of Death (Ninth Revision, 1975), operative from 1 January 1979. The term 'cause of death', as used in these tables and elsewhere in this Chapter, means '(a) the

disease or injury which initiated the train of morbid events leading directly to death, or (b) the circumstances of the accident or violence which produced the fatal injury.'

TABLE 6.12 - PRINCIPAL CAUSES OF DEATH, 1986 (a)

Causes of death and international number(b)	Western Australia			Australia		
	Persons	Per cent of all deaths	Rate (c)	Persons	Per cent of all deaths	Rate (c)
Infectious and parasitic diseases (000-139)	58	0.6	3.98	598	0.5	3.73
Neoplasms (140-239)—						
Malignant (140-208)—						
Digestive organs and peritoneum (150-159)	706	7.6	48.42	8,384	7.3	52.34
Trachea, bronchus and lung (162)	537	5.8	36.83	5,702	5.0	35.60
Genito-urinary organs (179-189)	357	3.8	24.49	4,337	3.8	27.08
Other	760	8.2	52.13	9,472	8.2	59.14
Total	2,360	25.4	161.87	27,895	24.3	174.15
Benign, other and unspecified (210-239)	25	0.3	1.71	261	0.2	1.63
Total	2,385	25.6	163.58	28,156	24.5	175.78
Endocrine, nutritional and metabolic diseases (240-279)	194	2.1	13.31	2,553	2.2	15.94
Diseases of blood and blood-forming organs (280-289)	23	0.2	1.58	441	0.4	2.75
Mental disorders (290-319)	126	1.4	8.64	1,601	1.4	10.00
Diseases of the nervous system and sense organs (320-389)	187	2.0	12.83	1,785	1.6	11.14
Diseases of the circulatory system (390-459)—						
Ischaemic heart disease (410-414)	2,526	27.1	173.25	32,003	27.8	199.80
Cerebrovascular disease (430-438)	889	9.6	60.97	12,491	10.9	77.98
Other	848	9.1	58.16	10,771	9.4	67.25
Total	4,263	45.8	292.39	55,265	48.1	345.03
Diseases of the respiratory system (460-519)—						
Chronic obstructive pulmonary disease (490-496)	422	4.5	28.94	5,554	4.8	34.67
Other	225	2.4	15.43	2,366	2.1	14.77
Total	647	7.0	44.38	7,920	6.9	49.45
Diseases of the digestive system (520-579)	327	3.5	22.43	3,931	3.4	24.54
Diseases of the genito-urinary system (580-629)	129	1.4	8.85	1,734	1.5	10.83
Complications of pregnancy, childbirth and the puerperium (630-676)	2	-	0.14	15	-	0.09
Diseases of the skin and subcutaneous tissue (680-709)	7	-	0.48	102	0.1	0.64
Diseases of the musculoskeletal system and connective tissue (710-739)	57	0.6	3.91	554	0.5	3.46
Congenital anomalies (740-759)	94	1.0	6.45	841	0.7	5.25
Certain conditions originating in the perinatal period (760-779)	82	0.9	5.62	864	0.8	5.39
Symptoms, signs and ill-defined conditions (780-799)	72	0.8	4.94	793	0.7	4.95
Accidents, poisonings and violence (800-999)—						
Motor vehicle traffic accidents (810-819)	252	2.7	17.28	2,987	2.6	18.65
Suicide and self inflicted injury (950-959)	164	1.8	11.25	1,982	1.7	12.37
Total	654	7.0	44.86	7,828	6.8	48.87
Other	31	0.3	2.13	414	0.4	2.58
ALL CAUSES	9,307	100.0	638.34	114,981	100.0	717.85

(a) Based on State of usual residence. Fetal deaths are excluded. (b) Classified in accordance with the *International Statistical Classification of Disease, Injuries and Cause of Deaths* (Ninth revision), operative from 1 January 1979. (c) Per 100,000 of mean resident population.

TABLE 6.13 - INFANT DEATHS—CAUSES OF DEATH, 1986 (a)

Causes of death and International number (b)	Western Australia		Australia	
	Number	Per cent of all causes	Number	Per cent of all causes
Causes mainly of prenatal and natal origin—				
Congenital anomalies (740-759)	63	29.4	590	27.4
Immaturity (765)	11	5.1	234	10.9
Birth trauma (767)	4	1.9	30	1.4
Hypoxia and birth asphyxia (768)	14	6.5	81	3.8
Respiratory distress syndrome (769)	28	13.1	138	6.4
Other respiratory conditions (770)	7	3.3	186	8.6
Infections specific to the perinatal period (771)	2	0.9	42	1.9
Fetal and neonatal haemorrhage (772)	8	3.7	73	3.4
Other	8	3.7	77	3.6
Total	145	67.8	1,451	67.4
Causes mainly of postnatal origin—				
Sudden death, cause unknown (798)	55	25.7	525	24.4
Other	14	6.5	178	8.3
Total	69	32.2	703	32.6
All causes	214	100.0	2,154	100.0

(a) Based on State of usual residence. Fetal deaths are excluded. (b) Classified in accordance with the *International Statistical Classification of Disease, Injuries and Cause of Death* (Ninth revision), operative from 1 January 1979.

Perinatal deaths. Since deaths within the first four weeks of life (neonatal deaths) are mainly due to conditions originating before or during birth, and the same conditions can cause fetal death (stillbirth), special tabulations are prepared combining the two. These are termed 'perinatal deaths.' The statistical definition of perinatal deaths in Australia was amended in 1979 and now includes all fetuses and infants delivered weighing at least 500 grams or, when birthweight is unavailable, the corresponding gestational age (22 weeks) or body length (25cm crown-wheel), whether alive or dead. The rates for fetal deaths and perinatal deaths are calculated per thousand live births only. The live births figure used to calculate these rates excludes those infants known to have weighed less than 500 grams at delivery.

Death rates.

Table 6.15 provides comparative data on deaths in Western Australia and Australia for 1986. The figures show that the crude death rate (the number of deaths per thousand of mean resident population) in Western Australia (6.38) is lower than the Australian figure of 7.18.

6.15 - DEATHS, WESTERN AUSTRALIA IN RELATION TO AUSTRALIA, 1986

Particulars	Western Australia	Australia
Number of deaths	9,307	114,981
Crude death rate (a)	6.38	7.18
Infant death rate (b)	8.83	8.85
Age-specific death rate (years) (c)—		
Under 1 year	9.23	9.03
1 - 4	0.58	0.48
5 - 9	0.27	0.22
10 - 14	0.13	0.23
15 - 19	0.67	0.74
20 - 24	0.89	1.04
25 - 29	0.93	0.90
30 - 34	0.87	0.95
35 - 39	1.00	1.10
40 - 44	1.76	1.82
45 - 49	2.64	2.86
50 - 54	4.87	4.93
55 - 59	7.79	8.26
60 - 64	13.26	13.28
65 - 69	19.79	21.26
70 - 74	32.77	33.90
75 - 79	55.01	53.77
80 - 84	88.15	85.29
85 and over	158.37	158.71

(a) Per 1,000 mean resident population. (b) Infant deaths per 1,000 live births. (c) Number of deaths per 1,000 persons in each age group. Excludes fetal deaths.

6.14 - PERINATAL DEATHS—NUMBER AND RATES

Particulars	1986			
	Western Australia		Australia	
	Number	Rate	Number	Rate
Fetal deaths	145	5.9	1,585	6.5
Neonatal deaths—				
Under 1 day	62	2.6	639	2.6
1 day and under 7 days	36	1.5	347	1.4
7 days and under 28 days	26	1.1	241	1.0
Total	124	5.1	1,227	5.0
Total perinatal deaths	269	11.0	2,812	11.5

The age-specific death rates for Western Australia are lower than for Australia, with the exception of the under 1 year, 1-4, 5-9, 75-79 and 80-84 age groups.

LIFE EXPECTANCY

TABLE 6.16 - COMPLETE EXPECTATION OF LIFE AT SELECTED AGES (a): AUSTRALIA (years)

Age	Expectation of life (b)		
	1981	1985	1986
Birth—			
Males	72.07	73.09	72.87
Females	79.27	79.32	79.18
1 year—			
Males	71.80	72.83	72.61
Females	78.88	78.97	78.79
20 years—			
Males	53.44	54.48	54.24
Females	60.27	60.43	60.18
40 years—			
Males	34.66	35.76	35.50
Females	40.76	41.00	40.77
60 years—			
Males	17.72	18.33	18.20
Females	22.51	22.81	22.60

(a) Based on annual life tables calculated by the Australian Statistician. These figures are based on estimated resident population. (b) The average number of additional years a person of given age and sex might expect to live if the age-specific death rates of the given period continued throughout their lifetime.

A life table is a life history of a hypothetical group, or cohort, of people, as it is diminished gradually by deaths. They form the

basis for the *stationary population* which is the population that would result from a constant number of births each year which had been subject at each age to the life table mortality rates.

A key value in life tables is the expectation of life remaining at each age. Expectation of life in Australia, particularly at birth, improved at every age in the first half of this century. Between 1953-55 and 1970-72 there was little change in expectation of life. However, since 1970-72 there have been significant improvements, particularly in expectation of life at birth which has increased between 1970-72 and 1986 from 68.1 years to 72.9 for males and from 74.8 years to 79.2 for females.

MARRIAGES

Religious and civil marriages.

Marriages may be celebrated either by ministers of religion registered for the purpose with the Registrar of Ministers of Religion in each State or Territory, by the Registrar-General, the Deputy Registrar-General or other State officers appointed under the Registration of Births, Deaths and Marriages Act (State), or, since 1973, by other persons authorised by the Commonwealth Attorney-General.

DIAGRAM 6.3
RATES OF BIRTH, DEATH AND MARRIAGE
Per Thousand of Mean Population 1880 to 1986
(Includes particulars of full-blood Aborigines from 1 January 1966)

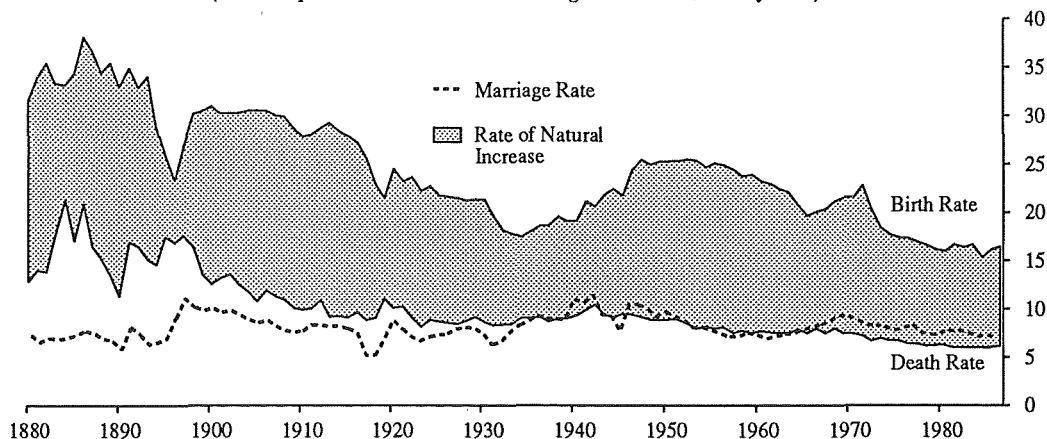


TABLE 6.17 - RELIGIOUS AND CIVIL MARRIAGES, 1986

Category of authorised celebrant	Western Australia		Australia	
	Number	Per cent of total marriages	Number	Per cent of total marriages
Ministers of religion—				
Registered ministers of recognised religious denominations (a)—				
Anglican Church of Australia	1,279	12.3	15,867	13.8
Assemblies of God in Australia	67	0.6	851	0.7
Baptist Union of Australia	147	1.4	1,981	1.7
Christian Brethren	17	0.2	284	0.2
Church of Jesus Christ of Latter Day Saints	24	0.2	263	0.2
Church of the Four Square Gospel in Australia	23	0.2	69	0.1
Churches of Christ in Australia	169	1.6	1,280	1.1
Jehovah's Witnesses	62	0.6	460	0.4
Lutheran Church of Australia Incorporated	49	0.5	1,275	1.1
New Church in Australia	79	0.8	83	0.1
Orthodox Churches (b)	86	0.8	2,332	2.0
Potter's House Christian Fellowship	38	0.4	50	-
Presbyterian Church of Australia	33	0.3	2,221	1.9
Roman Catholic Church	1,922	18.5	23,638	20.6
Salvation Army	82	0.8	831	0.7
Seventh-day Adventist Church	34	0.3	365	0.3
Uniting Church of Australia	807	7.8	12,850	11.2
Other	159	1.5	2,634	2.3
Total	5,077	48.9	67,334	58.6
Other ministers of religion	89	0.9	1,074	0.9
Total	5,166	49.8	68,408	59.5
Civil officers—				
Registrar-General, etc.	881	8.5	11,322	9.9
Other persons	4,332	41.7	35,183	30.6
Total	5,213	50.2	46,505	40.5
TOTAL MARRIAGES	10,379	100.0	114,913	100.0

(a) Under authority of the Marriage Act. (b) Includes denominations grouped under this heading in the proclamation made under the Marriage Act.

Table 6.17 which relates to marriages registered during 1986, shows the numbers and proportions celebrated by ministers of the principal religious denominations and by civil officers.

Table 6.18 gives details of the average age and of the marital status of bridegrooms and brides in each of the years 1981, 1985 and 1986.

TABLE 6.18 - AVERAGE AGES OF BRIDEGROOMS AND BRIDES (years)

Marital status	1981	1985	1986
Bridegrooms—			
Never married	24.97	25.85	26.12
Widowed	58.53	59.93	59.04
Divorced	37.92	38.69	39.47
All bridegrooms	28.47	29.56	29.87
Brides—			
Never married	22.38	23.48	23.80
Widowed	51.28	50.84	51.86
Divorced	34.27	35.09	35.36
All brides	25.55	26.74	27.03

DIVORCES

The *Family Law Act 1975* (Commonwealth), which came into operation on 5 January 1976, repealed the *Matrimonial Causes Act* and made new provisions relating to divorce. It also established the Family Court of Australia.

In Western Australia, jurisdiction relating to the *Family Law Act 1975* (Commonwealth) is vested in the Family Court of Western Australia constituted by the *Family Court Act 1975* (State).

The *Family Law Act* provides that an application by a party to a marriage for a decree of dissolution of the marriage shall be based on the ground that the marriage has broken down irretrievably. A decree of dissolution is made if, and only if, the Court is satisfied that the parties separated and thereafter lived separately and apart for a period of not less than twelve months immediately preceding the date of the filing of the application for dissolution of marriage, provided that the Court is satisfied

that there is no reasonable likelihood of cohabitation being resumed.

The Family Court of Western Australia also exercises jurisdiction in matters concerning the adoption of children, and the guardianship, custody or maintenance of children.

In Table 6.19 particulars are given of the duration of marriage, i.e. the interval be-

tween marriage and the time of dissolution, for marriages dissolved during 1986.

Almost one half of marriage dissolutions occurred when the duration of the marriage was 9 years or less. Dissolutions were highest in marriages with a duration of between 5 and 9 years.

TABLE 6.19 — DISSOLUTIONS OF MARRIAGE, 1986

Duration (years)	Marriages dissolved			
	Western Australia		Australia	
	Number	Per cent of total dissolutions	Number	Per cent of total dissolutions
Under 5	759	19.0	8,545	21.7
5 - 9	1,055	26.4	10,331	26.2
10 - 14	708	17.7	7,025	17.8
15 - 19	616	15.4	5,652	14.3
20 - 24	425	10.6	3,719	9.4
25 - 29	220	5.5	2,189	5.6
30 and over	218	5.4	1,948	4.9
Not stated	-	-	8	-
Total	4,001	100.0	39,417	100.0

Chapter 7

SOCIAL WELFARE

The Commonwealth and State Governments and a large number of voluntary agencies provide social welfare services for the population. The Commonwealth Government is concerned largely with providing fixed monetary pensions and benefits and repatriation services. It also provides, either directly or through State and local government authorities and voluntary agencies, for a wide range of welfare services for people with special needs. State agencies operate in the field of child welfare and distribute emergency relief in circumstances where Commonwealth Government assistance is not available. The voluntary agencies, many of which receive government aid, provide a wide range of services in various fields of social welfare.

Income maintenance payments to individuals are mostly provided by the Commonwealth Government. During 1985-86, \$19,192 million were expended in Australia on social security and welfare by the Commonwealth, which is 27.4 per cent of the total Government outlay.

In 1985-86 more than \$1,500 million were paid to Western Australians in the form of pensions and benefits.

Rates of benefit

Table 7.1 shows the maximum weekly rates applying to the range of pensions, benefits and allowances. More detailed information about the eligibility criteria is shown in the Annual Report of the Department of Social Security.

Income maintenance provisions

The introduction of a pension for aged persons in 1909 began Australia's national provision of social security payments. Since then a number of other regular income payments have been introduced to meet specific cases of perceived need: for people incapacitated for work; for spouses of age or invalid pensioners; for sole supporting parents. In addition, disability and service pensions have been provided for returned servicemen and women and their dependants.

TABLE 7.1 - MAXIMUM WEEKLY RATES OF BENEFIT
1986

<i>Benefit</i>	<i>\$</i>
Unemployment benefits—	
Single without dependants—	
16-17 years	50.00
18-20 years	88.20
21 years and over	95.40
Single with dependants	102.10
Married	170.30
Sickness benefits—	
Single without dependants—	
16-17 years	50.00
18 years and over	102.10
Single with dependants	102.10
Married	170.30
Mother's/guardian's allowance	12.00
Additional benefit for children	16.00
Rent assistance—	
Sickness beneficiary	15.00
Unemployment and special beneficiary	10.00
Remote area allowance	7.00
Age/Invalid pensions—	
Standard (single) rate	102.10
Married rate (each person)	85.15
Wife's/carer's pensions	85.15
Widow's pensions/Supporting parents benefit	102.10
Family allowance (a)—	
Children in families—	
First	22.80
Second	32.55
Third, fourth	39.00
Fifth	45.55
Children in institutions (each child)	39.00
Additional payment for multiple births—	
Triplets	150.00
Quadruplets (or more)	200.00
Double orphan's pensions (each child) (a)	55.70
Handicapped child's allowance	
(each child)(a)	85.00
Family income supplement (each child)	16.00
Mobility allowance	10.00
Funeral benefit (maximum payment)—	
For non-pensioner paying for funeral	20.00
For pensioner paying for funeral	40.00

(a) Monthly rate.

TABLE 7.2 - MAIN BENEFITS PAID UNDER THE SOCIAL SECURITY AND REPATRIATION ACTS: 1985-86

<i>Pension/benefit type</i>	<i>Number of beneficiaries</i>	<i>Expenditure (\$m)</i>
Social Security Act—		
Age pension (a)	105,207	450.2
Unemployment benefit	(b)54,358	294.2
Invalid pension (a)	33,786	155.5
Family allowance	(c)200,166	142.0
Supporting parent's benefit	19,306	134.0
Other (d)	..	123.7
Total	..	1,299.7
Repatriation Act—		
Disability pension (e)	35,223	211.4
Service pension (e)	36,423	

(a) Includes wife/carer. (b) Average number on benefit at end of each week during year. (c) Number of families. (d) Includes widows', orphans' pensions; sickness, special, funeral benefits; handicapped children's rehabilitation, sheltered employment allowances and family income supplement. (e) Includes pensions paid to wives, widows and dependants.

Age pensions

Women aged 60 and over and men aged 65 and over are eligible for the age pension subject to income and assets conditions and residential qualifications.

TABLE 7.3 - AGE PENSIONS: 30 JUNE 1986

<i>Particulars</i>	<i>Number of pensioners</i>
Male	32,273
Female	70,812
Wife/spouse carer	2,122
Persons	105,207

Service pensions

In addition to the Social Security age pension, the Department of Veterans' Affairs provides service pensions to male veterans aged 60 years and over and female veterans aged 55 and over. At June 1986, 36,423 service pensions were being paid, 21,262 to veterans and 15,161 to wives and widows of veterans.

TABLE 7.4 - SERVICE PENSIONS: 30 JUNE 1986

<i>War service</i>	<i>Number of pensions</i>
1914-18 war	433
1939-45 war	28,786
Korea and Malaya	355
British Commonwealth	5,854
Allied Forces	654
Special overseas service	177
Miscellaneous	164
Total	36,423

Invalid and disability pensions

An invalid pension is payable to people over 16 years of age who are permanently incapacitated for work (to the extent of at least 85 per cent), or are permanently blind. At 30 June 1986, 33,786 persons were receiving this pension, an increase of 2,684 on the number at June 1985.

TABLE 7.5 - INVALID PENSIONS: 30 JUNE 1986

<i>Particulars</i>	<i>Number of pensioners</i>
Male	18,891
Female	6,878
Wife/spouse carer	8,017
Persons	33,786

In addition to the invalid pension provided through the Department of Social Security, the Department of Veterans' Affairs provides a similar pension to veterans as compensation for incapacity accepted as war service related. At 30 June 1986, 35,223 disability pensions were being paid to 14,472 incapacitated veterans, 15,240 dependants of incapacitated veterans and 5,511 dependants of deceased veterans.

TABLE 7.6 - DISABILITY PENSIONS: 30 JUNE 1986

<i>War service</i>	<i>Number of pensions</i>
1914-18 war	1,599
1939-45 war	27,831
Korea/Malaya/F.E.S.R. (a)	872
Special Overseas Service	2,531
Peacetime Forces	2,375
Seamen's War Pension	15
Total	35,223

(a) Denotes Far East Strategic Reserve.

Allowances

Several allowances are provided to supplement disability and service pensions. These allowances vary according to the severity of disablement and the special needs of the pensioner. They include attendant's allowance, loss of earnings allowance, recreation transport allowance and domestic allowance. An education allowance is paid for children of special rate pensioners and children of veterans who died as a result of service.

TABLE 7.7 - REPATRIATION ACT—PENSION AND ALLOWANCE RATES: JUNE 1986
(Weekly rates unless otherwise indicated)

<i>Particulars</i>	<i>\$</i>
Disability pension—	
Special rate (TPI) (a)	190.30
Intermediate rate	131.00
General rate (100%)	71.75
War and defence widows' pensions	102.10
Service pensions—	
Single person	102.10
Married couple	170.30
Orphan's pensions—	
High rate	41.00
Low rate	20.50
Attendant's allowance—	
High rate	57.40
Low rate	28.70
Clothing allowance—	
High rate	2.45
Middle rate	1.60
Low rate	1.15
Allowances paid for certain amputations and/or loss of vision—	
Maximum	118.55
Minimum	8.60
Recreational transport allowances—	
High rate (monthly rate)	65.60
Low rate (monthly rate)	32.80
Vehicle assistance scheme (annual rate)	787.20
Veterans' children education scheme—	
Tertiary students—	
Maximum	73.30
Minimum	47.50
Secondary students—	
Maximum	37.10
Minimum	7.45
Allowances paid to service pensioners—	
Supplementary assistance	15.00
Guardian's allowance	12.00
Additional pension for each child	17.00
Remote area allowance—	
Single person	7.00
Married couple	12.00

(a) Totally and permanently incapacitated.

Carer's pension

A carer's pension is payable to the husband, wife or near relative of an age, invalid or service pensioner if he or she provides the pensioner with constant care and attention, at home, permanently or for a long time because the pensioner is severely disabled or has a serious illness. Persons already in receipt of a social security payment or service pension are not eligible to receive a carer's pension.

Widow's pension and supporting parent's benefit

The widow's pension was introduced in 1942 to provide a regular income for women who had lost the support of their partner.

There are three classes of widow pensioners: Class A— a widow with one or more dependent children in her care; Class B— a widow without dependent children who is at least fifty years of age, or is not less than forty-five years of age when her Class A pension ceases because she no longer has a dependent child in her care; and Class C—a widow under fifty years of age without dependent children who is in necessitous circumstances at the time of her husband's or defacto husband's death or within twenty-six weeks thereafter.

TABLE 7.8 - WIDOWS' PENSIONS: 30 JUNE 1986

<i>Particulars</i>	<i>Unit</i>	<i>Pensions</i>
Class A pensioners	No.	5,797
Class B pensioners	"	7,011
Class C pensioners	"	9
Total	"	12,817
Amount paid during year (a)	(\$'000)	72,504

(a) Includes allowances and rent assistance.

Sole parents who have the custody, care and control of a child aged under 16, or a dependent full-time student aged 16 to 24 inclusive can be eligible for a supporting parent's benefit. It was originally introduced in 1973 as the supporting mother's benefit and renamed in 1977 when extended to supporting fathers.

TABLE 7.9 - SUPPORTING PARENTS' BENEFITS
30 JUNE 1986

<i>Particulars</i>	<i>Number of beneficiaries</i>
Males	1,081
Females	18,225
Persons	19,306

Sheltered employment allowances

Sheltered employment allowances are payable to disabled persons who are employed in approved sheltered workshops and are otherwise qualified to receive an invalid pension or would become so qualified if they ceased to be provided with sheltered employment.

TABLE 7.10 - SHELTERED EMPLOYMENT ALLOWANCES: 30 JUNE 1986

<i>Particulars</i>	<i>Unit</i>	<i>Allowances</i>
Workshops paying allowances	No.	8
Sheltered employment allowances	"	783
Wife pensioners	"	79
Amount paid during the year	(\$'000)	4,709

Fringe benefits

The Commonwealth Government makes available to pensioners and recipients of supporting parent's benefits several 'fringe benefits'. In most cases these are subject to a special income test. These benefits include: a comprehensive range of pharmaceuticals free of charge; a one-third reduction in telephone rental (subject to the income of co-residents); reduced fares for Commonwealth Government railway and shipping services; postal redirection concessions; free hearing aids and free optometrical consultations if the practitioner directs the bill to the Health Insurance Commission which administers Medicare benefits.

The State Government, local government authorities and private organisations also provide certain fringe benefits. The most valuable of these are reductions in local government rates and in public transport charges.

UNEMPLOYMENT, SICKNESS AND SPECIAL BENEFITS

Unemployment benefits

The number of people receiving benefits has risen from 803 at June 1970 to 55,089 at June 1986 after a peak of 58,099 during 1982-83. The amount paid in this category of welfare expenditure is now exceeded only by age pension payments. During 1985-86 a total of 95,500 benefits were granted in Western Australia.

To be eligible for unemployment benefit a person must:

- have been unemployed for the period covered by the benefit;
- be capable of undertaking and willing to undertake suitable paid work;
- be taking reasonable steps to obtain work;

not be unemployed due to being, or having been, engaged in industrial action; and

not be unemployed due to industrial action by members of a trade union of which the person is a member.

TABLE 7.11 - UNEMPLOYMENT BENEFITS: 30 JUNE 1986

<i>Particulars</i>	<i>Unit</i>	<i>Benefits</i>
Number admitted to benefit during year	No.	95,500
Average number on benefit at end of each week	"	54,358
Number on benefit at end of year	"	55,089
Amount paid (a) during year	(\$'000)	294,186

(a) Comprises payment for beneficiaries, additional benefit for children, mother's/guardian's allowance and remote area allowance.

Sickness benefits

A sickness benefit is paid to people who have been temporarily incapacitated for work because of sickness or accident and who have suffered a loss of income as a result of the incapacity or who, but for the incapacity, would qualify for the unemployment benefit. During the 1985-86 financial year a total of 12,781 benefits were granted in Western Australia; at June 1986, 4,110 benefits were being paid.

TABLE 7.12 - SICKNESS BENEFITS: 1985-86

<i>Particulars</i>	<i>Unit</i>	<i>Benefits</i>
Number admitted to benefit during year	No.	12,781
Average number on benefit at end of each week	"	3,941
Number on benefit at end of year	"	4,110
Amount paid (a) during year	(\$'000)	23,326

(a) Comprises payment for beneficiaries, additional benefit for children, mother's/guardian's allowance, rent assistance and remote area allowance.

Special benefits

A special benefit may be paid to a person ineligible for a pension or for an unemployment or sickness benefit, if he is unable to earn a sufficient livelihood for himself and his dependants, and is suffering hardship.

TABLE 7.13 - SPECIAL BENEFITS: 1985-86

<i>Particulars</i>	<i>Unit</i>	<i>Benefits</i>
Number admitted to benefit during year	No.	12,430
Average number on benefit at end of each week	"	1,761
Number on benefit at end of year	"	1,830
Amount paid (a) during year	(\$'000)	10,333

(a) Comprises payment for beneficiaries, additional benefit for children, mother's/guardian's allowance, and remote area allowance.

Mobility allowance

This allowance is paid to severely handicapped persons who are gainfully employed or undertaking vocational training but who, because of their disabilities, are unable to use public transport to travel to and from their employment or training. The rate payable is \$10 per week, tax and income test free. It is not payable to persons who have received the benefit of sales tax exemption for a new vehicle during the previous two years.

Family allowances

In 1976 child endowment, along with tax rebates for dependent children, was replaced by a family allowance, usually payable to the mother. At the same time the value of the allowance was significantly increased so that total payments in Western Australia increased from \$76.3 million (consisting of taxation rebates for dependent children totalling \$53.6 million and child endowment payments of \$22.7 million) in 1975-76 to \$89.2 million in 1976-77.

The family allowance is paid to a person caring for children under sixteen years or full-time students aged 16-17 years who are wholly or substantially dependent on that person. From January 1987 this entitlement for students aged 16-17 years has been income tested. In some cases family allowance may be paid for full-time students aged 18-24 years. Family allowance is not paid for students receiving Tertiary Education Assistance or other related Commonwealth education allowances. Payment is usually made to the mother. Approved charitable, religious or government establishments are paid family allowances for children in their care.

Twelve months residence in Australia is required if the claimant and the child were not born here, but this requirement is

waived if the Department of Social Security is satisfied that they intend to remain in Australia permanently. Under certain conditions, family allowance may be paid to Australians who are temporarily absent overseas.

TABLE 7.14 - FAMILY ALLOWANCES: 30 JUNE 1986

<i>Particulars</i>	<i>Unit</i>	<i>Allowances</i>
Endowed families—		
Number of claims in force	No.	200,166
Number of endowed children	"	388,251
Average number of endowed children per claim	"	1.94
Approved establishments—		
Number of endowed child inmates	"	787
Amount paid during year	(\$'000)	142,044

Multiple births payments

From November 1985 discretionary act of grace payments to parents of quadruplets were replaced with a non-means tested, non-taxable payment. The payment was also extended to parents of triplets. Payments at the rate of \$150 a month for triplets and \$200 a month for quadruplets (and \$200 a month for higher multiples) in addition to family allowances are made until the children reach six years of age.

Handicapped child's allowance

The handicapped child's allowance is payable to parents or guardians of a physically or mentally handicapped child under sixteen years who is cared for at home and is in need of constant care and attention. The allowance continues to be payable for a dependent full-time student aged 16-24 years except where the student is in receipt of certain other social security payments. An allowance of \$85 per calendar month is payable free of income test for a severely handicapped child. For those handicapped children who require marginally less care and attention, a rate up to \$85 a calendar month is paid to parents or guardians with low incomes.

At 30 June 1986 there were 3,352 recipients of the allowance in respect of 3,589 handicapped children. The amount paid was \$3.6 million.

Double orphan's pension

A guardian or an institution may be paid a double orphan's pension for a child under 16, or a dependent full-time student aged 16

to 24 inclusive, whose parents are dead. The pension is also payable if one parent is dead and:

the whereabouts of the other parent are not known to the claimant;

the other parent has been convicted of an offence and sentenced to imprisonment for at least ten years and is serving that sentence;

the other parent is an inmate of a mental hospital and will require care and treatment in that or a similar hospital for an indefinite period.

A double orphans's pension may also be paid for a refugee child whose parents are both outside Australia or if their whereabouts are unknown.

There were 473 orphans at 30 June 1986. A total amount of \$413,000 was paid in orphans' pensions during 1985-86.

Family income supplement

This payment is an income tested non-taxable supplement for families not in receipt of other Commonwealth support. It is paid at a maximum rate of \$16 per week for each child under 16 years or dependent full-time student aged 16 to 24 inclusive.

At 30 June 1986, there were 3,387 families receiving \$5.5 million in family income supplement in respect of 9,215 children.

ADDITIONAL PAYMENTS FOR PENSIONERS

Additional pension for children

A pensioner is paid an additional amount of up to \$16 a week in respect of each child under 16 and each dependent full-time student aged 16 to 24 inclusive. For student children receiving payments under the Tertiary Education Assistance Scheme or the Secondary Allowances Scheme the maximum rate payable is \$14 a week. Additional pension is not payable in respect of children in receipt of a pension, benefit or allowance in their own right.

Mother's/guardian's allowance

An additional payment of up to \$12 a week is payable to a supporting parent beneficiary and to a pensioner who is single or married, but unable to live with their spouse because of the spouse's illness or infirmity.

Rent assistance/incentive allowance

Rent assistance is a tax-free allowance which may be paid to pensioners, rehabilitation allowees and supporting parent beneficiaries who pay rent, lodging, board and lodging or a site rent for a boat, caravan or other accommodation which the person occupies as their home.

All recipients of sheltered employment allowance and invalid pensioners undertaking training receive, in lieu of rent assistance, a non-taxable incentive allowance of \$15 a week free from any rent or income test.

Remote area allowance

Remote area allowance is payable to pensioners living in specified remote areas.

Special temporary allowance

For up to 12 weeks after the death of one of a married pensioner couple, the surviving pensioner is paid the equivalent of the two pensions that would have been paid if the spouse had not died.

Funeral benefits

A funeral benefit of up to \$40 is payable to a pensioner (and persons in receipt of certain other pension related payments) who is liable for the funeral cost of a deceased spouse, child or other pensioner. A lesser amount of \$20 is payable where a non-pensioner is liable for the funeral cost of a deceased aged, invalid or wife's pensioner (or a deceased claimant who would have been eligible for such a pension). 'Pensioner' means a person who satisfies the Commonwealth Government pensioner and fringe benefits income test.

There were 3,164 grants of funeral benefit during 1985-86, totalling \$94,000.

Payment of benefits outside Australia

Age, invalid and widows' pensions and supporting parents' benefits continue in force for recipients who left Australia on or after 8 May 1973 or whose pension or benefit is subject to the provisions of either of the reciprocal agreements with New Zealand or the United Kingdom. In certain cases of hardship, the pension or benefit may continue for people who left before 8 May 1973.

DEPARTMENT OF COMMUNITY SERVICES

The Department of Community Services administers programs which provide or subsidise services to the aged, the disabled, children and others in special need.

Rehabilitation services

Rehabilitation Services aim to provide accessible rehabilitation services to people with disabilities in the broad working age group. They aim to assist people with disabilities to make substantial gains towards employment, personal independence within the community, and the capacity to undertake household duties.

Toward this aim, Rehabilitation Services provide co-ordinated, individual programs to meet the special needs of the disabled. Assistance may be given in the following areas:

Vocational assistance. Assessing present work abilities; identifying suitable employment; assistance with retraining to gain skills needed for work; altering the work place to meet special needs of the disabled person; sponsorship to undertake further studies.

Independent living. Assistance in the form of aids to enable independence at home or in the community; assistance with special needs and adaptation.

Alternatives to work. Assistance for those people who are unable to return to work; adjustment of a lifestyle that does not include full-time work, for example voluntary work, sheltered employment or home bound employment.

Rehabilitation Services in Western Australia have developed outreach services with the aim of making rehabilitation more accessible to disabled people in their own community. Regional rehabilitation units have been established in Bunbury, Cannington, the Northern Metropolitan region (in Mirrabooka) and the Central Metropolitan region (in Perth). Other facilities include Melville Rehabilitation Centre, the Work Preparation Program in Osborne Park and the Commonwealth Rehabilitation Unit at Royal Perth (Rehabilitation) Hospital in Shenton Park.

Rehabilitation allowances. Persons who undertake a rehabilitation program with the

Rehabilitation Services and who are otherwise eligible for a social security pension or benefit are eligible to receive a rehabilitation allowance equivalent to the invalid pension. The allowance is subject to the same income and assets tests as are applied to the invalid pension. It is paid during treatment or training and for up to six months thereafter.

In instances where a person is accepted for vocational training, a training allowance is payable as well as assistance with books and equipment and reimbursement of fares.

TABLE 7.15 - REHABILITATION SERVICES: 1985-86

<i>Particulars</i>	<i>Number</i>
Number accepted for rehabilitation—	
Invalid pensioners	207
Unemployment and sickness beneficiaries	281
Other beneficiaries	284
Other (a)	1,310
Total	2,082
Number placed in employment	516
Expenditure (b)—	\$'000
Salaries	2,702
Rehabilitation Allowance (c)	2,926
Other	230
Total	5,858

(a) Includes workers' compensation recipients. (b) Includes recoveries made under the Social Security Act 1947. (c) Commenced 1 March 1983.

Assistance through welfare organisations

Aged or disabled persons homes grants. The Commonwealth Government provides financial assistance to religious, charitable and other organisations in providing accommodation for the aged or disabled.

The term 'aged person' means a man aged sixty-five years or over or a woman aged sixty years or over and includes the spouse of the aged person; 'disabled person' means a person who has attained the age of sixteen years and who is permanently blind or permanently incapacitated for work but does not include the spouse of that person unless the spouse is also disabled. Grants are made to organisations 'to encourage and assist the provision of suitable homes for eligible persons'. To be eligible for assistance an organisation must be one which is carried on other than for the purpose of profit or gain to its individual members, and may be a religious, charitable or benevolent organisation, an organisation of former members of the defence forces, an organisation approved

by the Governor-General, or local governing body.

TABLE 7.16 - AGED OR DISABLED PERSONS HOMES GRANTS: 1985-86

<i>Particulars</i>	<i>Unit</i>	<i>Grants</i>
Grants approved (a)	No.	12
Beds funded—		
Type of accommodation—		
Self-contained	"	33
Hostel	"	176
Nursing	"	-
Total beds	"	209
Grants paid during year	(\$'000)	3,572

(a) A supplementary grant may be approved in a year subsequent to the year when the original grant was approved. In this table each supplementary grant has been included in the year in which the additional amount was actually approved.

Hostel care subsidies

The Commonwealth currently pays hostel, personal and respite care subsidies to eligible organisations providing hostel type accommodation and services for aged or disabled people. The personal care subsidy is paid for hostel residents assessed as requiring, and receiving, assistance in the performance of daily living tasks. The subsidy is payable in addition to hostel care subsidy.

Respite care bed subsidy is paid to encourage the provision of respite care beds in hostels. This initiative assists those families and individuals who care for elderly people in their homes but who require a facility to allow short breaks from the demands of care at home.

During 1985-86 \$6,285,000 in hostel, personal and respite care subsidies was paid to organisations in respect of 176 approved beds.

Nursing home benefits.

There are two forms of Commonwealth benefit payable in respect of patients accommodated in premises approved as nursing homes under the *National Health Act 1953*. These benefits are outlined below:

Basic nursing home benefit. The Commonwealth pays basic nursing home benefits for all qualified nursing home patients other than those who are entitled to damages or compensation. Basic benefit levels are reviewed and adjusted annually.

Commonwealth extensive care benefit. The Commonwealth extensive care benefit is payable in addition to the Commonwealth basic benefit, for patients who need and receive 'extensive care' as defined in the National Health Act. As in the case of the Commonwealth basic benefit, the extensive care benefit is only payable for qualified patients who are not entitled to damages or compensation.

Minimum patient contribution. All participating nursing home patients are normally required to make a statutory minimum contribution towards the cost of their accommodation and care in the nursing home in recognition of those costs which would otherwise be incurred outside the nursing home in any alternative long-term residence.

Domiciliary nursing care benefit.

The domiciliary nursing care benefit is paid to assist in meeting the cost of home nursing for persons aged sixteen years or over who are chronically ill and are being cared for in the private home of a relative or other approved person. The benefit applies to a patient who has a continuing need for nursing care, and is receiving such care given by or under the supervision of a registered nurse.

Home and community care program.

The Home and Community Care Program is a cost-shared program between the Commonwealth of Australia and State Governments which aims to develop an integrated range of home and community care services for frail or at risk aged persons, and younger disabled persons and their carers, thereby avoiding premature or inappropriate institutionalisation.

Supported accommodation assistance program.

This program provides for a cost-shared arrangement between the Commonwealth of Australia and State Governments and aims to assist organisations to provide a range of supported accommodation and related services to people who are either permanently or temporarily homeless as a result of crisis. The program is directed at men, women, young people and dependants who need such assistance to move towards independent living, wherever possible and appropriate.

Disability services.

Grants towards the cost of providing capital projects, maintenance and equipment may be made to eligible organisations which provide 'prescribed services' for disabled persons. Grants are also available for rental and certain salary payments. Prescribed services include training, activity therapy, sheltered employment, residential accommodation, holiday accommodation, recreational facilities and rehabilitation facilities. Assistance may be provided towards meeting the cost of purchase or construction of premises to provide the prescribed services. The payment of subsidy for residential accommodation may be extended to include accommodation for disabled persons capable of engaging in normal employment and to help meet expenditure on building maintenance, rental of premises, equipment, and the salaries of certain staff involved in providing prescribed services.

TABLE 7.17 - HANDICAPPED PERSON'S ASSISTANCE ACT (a), EXPENDITURE: 1985-86

Particulars	\$
Capital	867,059
Equipment	704,636
Maintenance	173,518
Rent	318,069
Salaries	9,281,108
Training fees	7,900
Open employment incentive bonus (b)	9,000
Total	11,361,290

(a) Provided under the *Handicapped Person's Assistance Act 1974*. (b) Introduced 1 October 1983.

Childrens services program

The Commonwealth provides capital and recurrent assistance for a wide range of services such as day care centres, family day care and emergency and occasional care. Services for school aged children include before and after school care and vacation care. Other projects provide support for families in crisis and special services for Aboriginal, migrant and disabled children.

The Commonwealth has allocated some \$107 million to create 20,000 new child care places to be introduced nationally between July 1985 and June 1988. At 30 June 1986 some 229 services were being funded in Western Australia by this three year plan, and the existing scheme. The Western Aus-

tralian programs received \$16.342 million in funding in 1985-86.

TABLE 7.18 - CHILDREN'S SERVICES PROGRAMS FUNDED (a): 30 June 1986

Service type	No.	\$'000
Child care services and neighbourhood centres (b)	116	6,467
Family day care schemes	11	3,039
Outside school hours care	52	487
Children's services workers	2	52
Research and evaluation (c)	..	3
Advice and resource services	14	388
Services for disabled children	4	51
Family support services scheme (d)		508
Family and child assistance services (e)	..	416
Miscellaneous services (e)	..	152

(a) Excludes approximately \$4.8m given direct by the Commonwealth via State funding for child care services. 30 services were provided by State Government from these funds. (b) Includes 9 family support services. (c) Funding for various projects; not tied to any set number of positions. (d) Positions allocated were not strictly for child care services. (e) Child care places were not provided with these services.

In addition to those shown in Table 7.18 there were 30 child care services provided by the State Government from funds supplied by the Commonwealth.

DEPARTMENT FOR COMMUNITY SERVICES, WESTERN AUSTRALIA

The functions of the Department for Community Services, are defined in the *Community Services Act 1972*. The Acts administered by the Director-General of the Department for Community Services, subject to any direction of the Minister, are the Community Services Act, the Child Welfare Act, the Welfare and Assistance Act and the Adoption of Children Act.

STATE FINANCIAL ASSISTANCE

Under the provisions of the *Welfare and Assistance Act 1961*, the State Government, through the Department of Community Services, administers the grant of financial assistance to families and individuals in need. The Department is able to provide financial assistance in a wide range of circumstances to persons who have a basic and pressing material need which they are unable to provide for from their own resources or through a more appropriate welfare agency.

TABLE 7.19 - DEPARTMENTAL EXPENDITURE:
1985-86

Nature of expenditure	\$'000
Administration	11,808
Field services	18,120
Departmental establishments	12,458
Maintenance of children	4,713
Financial assistance	5,191
Community Welfare assistance (a)	9,823
Residential reserves	340
Residential and alternative children's services (b)	2,780
Youth Affairs Bureau	327
Aged Persons Bureau	116
Total expenditure	65,676
Total revenue	6,858
Net expenditure	58,818

(a) Includes transfers from other Government agencies. The comparable 1984-85 figure is \$5,764,000. (b) Resumed from Treasury in 1985-86. The comparable 1984-85 figure is \$2,233,000.

TABLE 7.20 - SUPPLEMENTARY ASSISTANCE
PROVIDED BY DEPARTMENT FOR COMMUNITY
SERVICES: 1985-86

Category	No. of issues	Value \$'000
Emergency assistance	..	4,709
Basic domestic expenses—	69,365	2,940
Food and medication	66,580	2,780
Energy and water arrears	1,417	75
Housing arrears	390	23
Essential household equipment	535	42
Clothing	453	20
High school clothing	4,518	365
Optical	4,471	224
Furniture removal costs	1,970	209
Public housing ingoing fees	3,437	180
Medical travel (a)	3,926	119
Other	..	672
Continuous assistance	248	210
Domestic energy rebate	..	8,276

(a) Excludes payments made under the Isolated Patients Travel and Accommodation Scheme (IPTAAS).

CHILD WELFARE

Under the provisions of the *Child Welfare Act 1947* the State Government, through the Department for Community Services, is responsible for the care of wards and children placed under control and supervision or released on probation by Childrens Courts. A child is defined as 'any boy or girl under the age of eighteen years'. Persons may be licensed to care for children and are subject to supervision by the Department. Another function of the Department is the arranging of adoptions. Under the Act, the Department has authority to decide which centre or facility or what form of treatment is appropriate to the needs of a child commit-

ted by a Childrens Court to the care of the Department.

Maintenance of Children.

The Department for Community Services makes payments to foster parents and establishments having children in their care. The rates of these payments are shown in Table 7.21.

TABLE 7.21 - STATE GOVERNMENT MAINTENANCE
OF CHILDREN PAYMENTS
MAXIMUM WEEKLY RATES
\$

Subsidy or allowance	November 1986	
	Fostered	Group Home
Subsidy—		
Wards of the State—		
Primary school age	41.00	44.75
High school age	47.00	50.00
Children not wards of the State—		
Departmentally arranged placement—		
Primary school age	41.00	44.75
High school age	47.00	50.00
Privately arranged placement—		
Near relative	13.80	13.80
Non relative	35.50	35.50
Pre-adoptive	41.00	41.00
Additional allowances—		
Pocket money—		
Wards of the State—		
Primary school age	1.00	1.00
High school - years 8-10	3.00	3.00
- years 11-12	5.00	5.00
Working (awaiting benefits)	10.00	10.00
Children not wards of the State—		
Emergency bed fees—		
Ward only	5.00	—

One dollar per week for each child maintained is paid to the establishments by the State Lotteries Commission. Where an establishment refuses assistance from the Commission on religious or moral grounds the State Government may grant an equivalent allowance to the establishment for each ward maintained. All establishments and foster parents having the care of children receive family allowances from the Commonwealth Government.

Supervision of children.

A child committed to the care of the Department for Community Services becomes a ward of the Department. A ward may be placed in a Departmental centre or facility, boarded out with a relative or other approved person, or placed in suitable em-

ployment. Where a child is placed under the control of the Department, the child's parents retain guardianship but the child may be treated as a ward. The Director-General of the Department has authority to place wards of working age in employment or apprenticeship.

Day care services.

Any person who provides day-to-day care of children under the age of six years must be approved and licensed by the Department for Community Services. Licensed services are required to provide minimum standards for premises, equipment, staffing and the general conduct of such services. Day Care Services include day care centres both privately owned and government funded, family day care centres and neighbourhood centres. Day care centres provide group care on a full-time, part-time or occasional basis. Family day care is a supervised and co-ordinated system of child care which is conducted by approved and licensed caregivers in their own homes. Neighbourhood centres provide day care and occasional care and other family support services to their communities. The Department for Community Services provides an advisory service to all day care services ensuring the maintenance of minimum standards and promotion of optimum standards. It provides information to parents seeking services, and assists community groups to identify child care needs and to assist in the establishment of new services.

The information presented in Table 7.22 is the result of a census of all day care services registered with the Department for Community Services.

TABLE 7.22 - NUMBER OF CHILDREN ATTENDING DAY CARE SERVICES DURING CENSUS WEEK

Type of service	Week ending 1 December 1985
Day care	5,393
Occasional care	1,135
Family day care	2,668
Total	9,196

Establishments.

The State Government subsidises private establishments for children in Western Australia. Most of these centres and facilities are conducted by religious organisations. All

private establishments having the care of children who are wards, placed under control or private children under six years of age are subject to the supervision of the Department for Community Services.

Departmental establishments provide: short-term accommodation for children in need of care and children awaiting proceedings in Childrens Courts; assessment facilities for children coming into the care of the Department; treatment centres of a secure nature; and hostel accommodation. Children cared for in these establishments are aged from three years to eighteen years. Children under three years of age requiring short term care are placed either by arrangement at a State run mothercraft home and training centre, or in the care of short term approved foster parents.

Adoption of children.

All children eligible for adoption in Western Australia come under the guardianship of the Director-General of the Department for Community Services. A person wishing to adopt a child may apply direct to the Department or through a solicitor. Each applicant must be assessed by the Department for suitability, and an order for the legalisation of an adoption must be obtained from a Judge of the Family Court of Western Australia.

Employment of children.

The *Child Welfare Act 1947* provides the conditions under which children may engage in street trading. Male children under twelve and female children under school leaving age are not permitted to engage in street trading.

AUTHORITY FOR INTELLECTUALLY HANDICAPPED PERSONS

The Authority for Intellectually Handicapped Persons commenced operations in January 1986. It is a State Government agency, its primary responsibility being to provide for intellectually handicapped persons those services and facilities previously provided by the Health Department. The Authority is also referred to as 'Irrabeena'. The Act which established the Authority also specified its functions and powers and made

provision for the funding and licensing of non-government services.

The Authority's philosophy of normalisation emphasises the integration of people with an intellectual handicap into the main stream of society and support is provided with the aim of maintaining clients as members of their communities. A further aim is to promote the care of such people by means of services which are available to the general public.

At June 1986 the Authority employed a staff of 1,613 persons. Just over half of these were social trainers. It had 4,438 clients, 2,563 of whom were classified as being mildly to moderately handicapped and 832 severely or profoundly handicapped.

Irrabeena organises its services on a geographical basis. There are four metropolitan regions and the remainder of the State is designated the country region.

Councils have been formed in all regions to give consumers, both parents and clients, a real voice in what is happening and a way of raising concern and commenting on relevant issues.

The role of Irrabeena staff is to optimise the conditions of learning for the majority of school age children who now attend school full-time.

Through its vocational services Irrabeena aims to enable people to undertake meaningful and productive work in either supported or competitive employment.

Irrabeena offers a number of options for persons who are unable to continue living with their families or as independent members of the community. There are 23 units, ranging in size from 14 to 66 beds, accommodating more than 700 people. A further 85 people live in 17 shared houses of three to five bedrooms with some staff support.

Many other specialist services are available, such as, genetic counselling, dietary advice, screening for hearing problems, podiatry and dental care.

In recent years the importance of recreation has been highlighted and activities range from holiday camps, sporting clubs and gardening, to going out to dinner—all with the goal of creating feelings of pleasure and achievement.

Chapter 8

HEALTH

The Commonwealth Government and State Government health authorities, together with Boards of Health under local government administration, co-operate in maintaining health services and in the prevention and control of infectious diseases in Western Australia. The Commonwealth provides untied identifiable health grants within general revenue grants to the States and the Northern Territory as a contribution towards the cost of health programs.

Under the Medicare program, all States and Territories are compensated by Medicare grants, outside the identified health grants and tax sharing arrangements, for revenue losses and additional medical costs directly attributable to the provision of free public hospital accommodation and treatment.

COMMONWEALTH GOVERNMENT HEALTH BENEFITS AND ASSISTANCE

Medicare

The universal hospital and medical benefits scheme known as Medicare was introduced by the Commonwealth Government on 1 February 1984.

Medicare benefits are available to all persons ordinarily resident in Australia with the exception of members of foreign diplomatic missions and their dependants. Short-term visitors to Australia (i.e. less than 6 months) are responsible for the full cost of their own medical and hospital treatment. Medical services in Australia are generally delivered by either private medical practitioners on a fee-for-service basis, or medical practitioners employed in hospitals.

Hospital care

Basic public hospital services are provided free of charge. Through Medicare grants to the States the cost of out-patient treatment and in-patient accommodation and care in a shared ward by a doctor employed by a hospital are covered. The scheme does not cover the cost of private accommodation in a public hospital, charges for private hospital treatment, or care in a public hospital by a doctor of the patient's choice. It is possible however for persons to take out insurance with private health funds to cover these situations.

Other benefits

Details of nursing home benefits are contained in Chapter 7. Health program grants are payable to eligible organisations to meet the cost, or such proportion of the cost as the Minister for Health may determine, of approved health services provided outside of hospitals by staff employed on a salaried or sessional basis. Under the scheme relating to isolated patients' travel and accommodation assistance financial help is provided to people in isolated areas who need to travel more than 200 kilometres from their home to obtain specialist medical treatment, oral surgery or orthodontic work not locally available. A Pharmaceutical Benefits Scheme provides assistance towards the cost of a comprehensive range of drugs and medicines supplied by an approved chemist upon presentation of a prescription from the patient's medical or dental practitioner, or by an approved hospital to patients receiving treatment at the hospital.

STATE GOVERNMENT HEALTH SERVICES

The Health Department of Western Australia co-ordinates and manages health care functions and services throughout the State. The Department takes its authority from the *Health Act 1911*, the *Hospitals Act 1927* and the *Mental Health Act 1962*. Apart from these major Acts, the Department administers a wide range of other legislation incorporating matters of individual and community health protection, treatment and regulation.

A pathology laboratory service maintained by the department provides diagnostic medical laboratory services to government non-teaching hospitals, charitable institutions and

general practitioners who elect to use it. It also shares with the Department of Medicine of the University of Western Australia much of the diagnostic medical laboratory of the Queen Elizabeth II Medical Centre.

The Health Promotion Services of the Department, through central and regional offices, provide training and resource material for health education activities throughout the State. The Western Australian Government subsidises the cost of dental care for pensioners and persons on low incomes who are treated at the Perth Dental Hospital and at its clinics in the metropolitan area and some major country centres.

A Health Advisory Network provides health care consumers and providers with a channel of communication through which the Minister for Health can be advised of health care needs. The Network's functions and responsibilities include: planning and developing health care service objectives for input to Departmental planning and government policy; acting as an information exchange for ideas and proposals about health care; and providing effective feedback, from both consumers and providers, about health services.

Community health services

In addition to measures provided for immunisation against infectious diseases, the Community Nursing, Community Health and Dental Health Branches of the Health Department of Western Australia assist in maintaining the general health and well-being of children in Western Australia.

Child Health Centres are established throughout the State to support, advise, and counsel parents in relation to the care of infants and children under school age. A health surveillance program is available to monitor the growth and development of children, and screening services are provided to detect hearing, visual, language and other physical or behavioural disorders.

TABLE 8.1 - CHILD HEALTH CENTRES
AT 31 DECEMBER

Particulars	1986
Child health centres	218
Attendances at centres (a)—	
Individual infants (0-5 years old)	73,000
Total attendances	303,500
Visits to newborn infants (a)	38,000

(a) Year ended 31 December estimated.

School health services are provided by community nurses, again with back-up from the child health medical officers. The service undertakes a full health appraisal including vision and hearing screening of every child in pre-school or Year 1 at school. Subsequent screening for visual problems is carried out routinely on two further occasions during school life, and a colour vision screening of boys is undertaken in Year 4. Screening for hearing loss and scoliosis is also arranged for older children. The School Dental Services Scheme provides preventive dentistry in centres established in strategically placed primary schools. Smaller schools are serviced by mobile dental caravans. Children in remote or isolated areas receive dental care from itinerant dental officers visiting communities on a biannual basis.

Community health nurses provide health services to disadvantaged and low socio economic groups within the community. The nurses in this section provide a high standard of preventive and therapeutic health care to the children and adults of Aboriginal communities, particularly in the remote areas of the State. Other minority groups, such as refugees, are helped through collaboration with the Child Health and School Health Services, and with hospitals throughout Western Australia.

Mental health services

The Health Department of Western Australia, through its Psychiatric Services administers hospitals for the treatment of mental illness, community mental health centres, child and adolescent clinics, day care facilities, training centres, hostels, sheltered workshops and domiciliary services for psychiatric patients.

OTHER HEALTH SERVICES

Royal Flying Doctor Service of Australia

The Royal Flying Doctor Service of Australia is a non-profit organisation financed by grants from the Commonwealth and State Governments and by private donations. The principal function of the Service is to provide aerial medical services for all per-

sons in Western Australia irrespective of their location and economic situation.

The radio network of the Royal Flying Doctor Service is regularly used in the work of Schools of the Air conducted by the Education Department, and also for the transmission and receipt of telegrams. In addition, it may be used, as the need arises, in connection with flood relief, in searching for lost parties and during cyclones or other emergencies.

**TABLE 8.2 - ROYAL FLYING DOCTOR SERVICE OF AUSTRALIA
OPERATIONS OF WESTERN AUSTRALIAN SECTION**

<i>Particulars</i>	<i>1985-86</i>
Expenditure (operational) \$'000	5,307
Number of-	
Medical flights	6,696
Nautical miles flown	1,164,231
Patients transported	3,720
Patients attended	14,346
Radio and telephone consultations	510

The St John Ambulance Association

The St John Ambulance Association is responsible for the road ambulance service and for teaching first aid throughout Western Australia. The Association also co-operates closely with the Royal Flying Doctor Service in transporting patients by air throughout the State.

The Association is a non-profit organisation. The main sources of finance are charges on users of the service, members' contributions to the Ambulance Benefit Fund, donations by individuals and grants from the State Government and the Lotteries Commission.

The Medic Alert Foundation serviced by the Association in Western Australia provides bracelets or necklets to persons who have a medical condition which may affect their treatment in the event of accident or collapse. Under such circumstances these persons may be unable to communicate effectively but the information on the bracelet would enable emergency medical personnel to assess the patient's needs. If necessary further detail could be obtained from the Association computer records.

During 1985-86 approximately 1,900 bracelets and necklets were issued bringing the total issued in Western Australia to 33,906.

TABLE 8.3 - THE ST JOHN AMBULANCE ASSOCIATION WESTERN AUSTRALIA

<i>Particulars</i>	<i>1985-86</i>
Ambulance service—	
Patients transported	72,800
Kilometres travelled	2,616,000
First aid classes—	
Certificates issued	21,200

COMMUNICABLE DISEASES

The *Quarantine Act 1908* provides for the quarantine of humans, animals and plants. The Commonwealth Department of Health administers the Act in matters relating to humans whilst aspects relating to animals and plants are the responsibility of the Department of Primary Industry. The *Health Act 1911* provides for the compulsory notification of infectious diseases and for the application of preventive measures.

The principal diseases notified to the Health Department during 1986 were gonorrhea (1,572), hepatitis A (504), venereal warts (413), hepatitis B (328), syphilis (252), trachoma (232), and salmonella infections (214).

HOSPITALS

Commonwealth Government hospitals

The Repatriation General Hospital, Hollywood provides free treatment for recipients of pensions payable under the Repatriation Act (according to the scope of their eligibility), and in some cases, for their dependants. Free treatment is also available for some other categories of former members of the Defence Forces and certain dependants.

State Government hospitals

Major government and government-assisted hospitals are situated in the Perth metropolitan area and in regional centres throughout the State.

TABLE 8.4 - STATE GOVERNMENT AND GOVERNMENT ASSISTED HOSPITALS (a)

<i>Particulars</i>		<i>1985-86</i>
Expenditure—		
Capital funds	\$'000	78,092
Hospital Fund—		
Establishment		
and domestic (b)	\$'000	40,916
Salaries and wages	\$'000	408,211
Other	\$'000	123,496
Total	\$'000	650,715
Number of—		
Hospitals (c)—		
Departmental		46
Board		46
Total		92
Beds (d)—		
Departmental		3,125
Board		3,677
Total		6,802
Staff (c)—		
Medical		959
Nursing		8,580
Other		9,157
Total		18,696
In-patients—		
Treated		252,298
In-patient days		1,778,083
Out-patients—		
Treatments		2,672,938

(a) Includes particulars of the Perth Dental Hospital, and Mount Henry Hospital and Sunset Hospital for long-term patients but excludes private hospitals receiving deficit funding. (b) Maintenance of equipment, furnishings and minor repairs. (c) At 30 June. (d) Allocated beds at 31 July. It is estimated that 75 per cent of these beds are staffed.

In addition to the hospitals included in the above table there are twenty-four Government nursing homes located in the Perth metropolitan area and the country regional centres.

Private hospitals and nursing homes

In addition to the government hospitals there are a number of private general and maternity hospitals, which are registered and inspected by the Health Department of Western Australia. The principal private hospitals are those established by religious

bodies in the metropolitan area and the main country towns.

At 30 June 1986 there were 116 private hospitals and nursing homes in Western Australia with a total bed capacity of 6,583 at the date.

TABLE 8.5 - PRIVATE HOSPITALS (a)

<i>Particulars</i>	<i>1985-86</i>
Number—	
Religious and charitable	7
Profit making	12
Other	1
Total	20
Beds (b)	1,940

(a) Registered by the Health Department of Western Australia. (b) Number of approved beds at 30 June.

Mental health institutions

The Mental Health Act provides for the admission of patients to hospitals approved for the purpose, either on referral by a medical practitioner or by order of a Justice of the Peace supported by the referral of a medical practitioner. Special provisions exist for the detention for observation or treatment of persons admitted by order of a court or from a prison. The Act also provides for voluntary admissions. A person not less than eighteen years of age may be granted admission on his own request. Younger persons may be admitted on the application of a parent or guardian.

TABLE 8.6 - PSYCHIATRIC SERVICES

<i>Particulars</i>	<i>1985-86</i>
Expenditure—	
Salaries and wages	\$'000 44,101
Other	\$'000 8,482
Total	\$'000 52,583
Number of (a)—	
Beds (b)	883
Separations (c)	2,572

(a) At 30 June. (b) Approved beds. (c) Includes deaths.

Chapter 9

LAW, ORDER AND PUBLIC SAFETY

The law in force in Western Australia is contained in The Statutes of Western Australia, comprising legislation passed by the Western Australian Parliament and certain Imperial Acts which have been adopted, and in the Commonwealth Acts in so far as they apply to Western Australia. Under the Constitution of the Commonwealth of Australia, 'when a law of a State is inconsistent with a law of the Commonwealth, the latter shall prevail, and the former shall, to the extent of the inconsistency, be invalid.'

CROWN LAW DEPARTMENT

The Crown Law Department is administered, subject to the control of the Attorney General, by the Under Secretary for Law. The Department is responsible for the Supreme Court Central Office, the District Court Registry, the Family Court Registry, Court Offices throughout the State (except Childrens Courts), the Crown Solicitor's Office, the Public Trust Office, the Registrar General's Office and the Law Reform Commission. The Department, in addition to administering the Acts which come under the portfolio of the Attorney General, conducts Crown legal business and, when required, acts for and advises State Government Departments and instrumentalities.

LAW COURTS

In Chapter 21, reference is made to the Federal Court of Australia, the Australian Conciliation and Arbitration Commission, the Western Australian Industrial Appeal Court, and The Western Australian Industrial Commission.

High Court of Australia

The High Court of Australia is the Federal Supreme Court. The Constitution requires that there shall be a Chief Justice and not less than two other Justices of the High Court. At 31 December 1986 there were 6 other Justices. Sittings are held in the

capital city of each State as occasion requires. The High Court exercises both original and appellate jurisdiction, acting as a court of appeal for Australia.

Supreme Court of Western Australia

The Supreme Court of Western Australia, consisted of a Chief Justice, eight other Judges and two Masters at 31 December 1986. The jurisdiction of the Court in both civil and criminal matters is exercised by a single Judge, sitting alone or with a jury, unless it is provided that an action must be brought before a Full Court. Criminal cases are heard before a jury. Appeals are heard against judgements of the Supreme Court and the District Court as well as against decisions of the magistrates in the Courts of Petty Sessions. Appeal from a judgement of the Supreme Court of Western Australia in some cases lies to the High Court of Australia.

The District Court of Western Australia

At 31 December 1986 the District Court of Western Australia consisted of a Chief Judge and eleven other Judges. The jurisdiction of the Court is exercised by a Judge sitting alone or with a jury. Criminal cases must be heard before a Judge and jury.

The Court has the same jurisdiction as the Supreme Court with respect to actions claiming damages for death or bodily injury, otherwise, its civil jurisdiction exists broadly up to a maximum of \$80,000. Criminal jurisdiction exists in respect of indictable offences except those for which the penalty may be life imprisonment or strict security life imprisonment, such cases being under the jurisdiction of the Supreme Court.

Appeals from a District Court Judge lie, in the civil jurisdiction, to the Full Court of the Supreme Court and, in the criminal jurisdiction, to the Court of Criminal Appeal.

Family Court of Western Australia

The Family Court of Western Australia consisted of a Chairman of Judges and four other Judges, at 31 December 1986. The jurisdiction of the Court is exercisable by one Judge.

The Court hears petitions for divorce and has jurisdiction in the welfare and custody of children and in disputes as to maintenance and property of marriage.

Appeals in respect of federal jurisdiction matters lie to the Full Court of the Family Court of Australia and appeals in respect of non-federal jurisdiction matters lie to the Full Court of the Supreme Court of Western Australia.

TABLE 9.1 - FAMILY COURT OF WESTERN AUSTRALIA

Particulars	1981	1985	1986
Dissolution of Marriage—			
Number of—			
Applications filed	3,937	3,940	3,751
Decrees made	3,481	4,039	4,001

Courts of Petty Sessions

Courts of Petty Sessions are held at centres of population throughout the State. Two or more Justices of the Peace sitting together in petty sessions may deal with cases which could be decided by a magistrate sitting alone.

Childrens Courts

Childrens Courts deal with offenders under the age of eighteen years and certain cases of offences against children. Further reference to Childrens Courts appears in the section *Child Welfare* in Chapter 7.

Local Courts

Local Courts are held throughout the State to determine minor civil issues. Jurisdiction is limited in most cases to claims not exceeding \$6,000. A Small Debts Division of the Local Court provides a quick and less expensive means of recovering debts of less than \$2,000.

Coroners Courts

Coroners Courts may be held to inquire into the circumstances of sudden, unnatural and suspected deaths or the cause and origin of fires. A coroner may charge a person with a major offence and commit him for trial at a higher court.

Licensing Court of Western Australia

The Licensing Court of Western Australia has exclusive jurisdiction to hear and determine all applications under the Liquor Act in respect of licences, provisional certificates and permits relating to the sale, supply and consumption of liquor. Appeal against a direction, determination or order of the Court lies to the Supreme Court, but only where the appeal involves a question of law.

Small Claims Tribunals

Small Claims Tribunals deal with claims involving an amount less than \$2,000. A Tribunal is constituted by a referee sitting alone and may be constituted at any place in the State.

CONVICTIONS IN COURTS

Number of convictions

It is important to bear in mind when considering the particulars shown in Table 9.2 that the figures relate to the *number of convictions* recorded and not to the *number of persons* convicted. Thus, where a person is convicted on more than one count each conviction so recorded has been included in the statistics.

Under the provisions of parking facilities legislation and municipal by-laws, fines may be imposed without court action for minor traffic offences. These minor offences (which are excluded from Table 9.2) numbered 373,662 in 1984, 416,774 in 1985 and 401,415 in 1986. Fines may also be imposed without court action for certain offences under the *Road Traffic Act 1974*. In 1985-86 there were 131,470 such fines imposed.

TABLE 9.2 - COURT STATISTICS - NUMBER OF CONVICTIONS: 1984-85
 [Excluding Perth and East Perth Courts of Petty Sessions (a)]

Code (b)	Description of offence	Supreme and District Courts	Courts of Petty Sessions	Childrens Courts	Total
100	Offences against the person	427	2,056	1,042	3,525
200	Robbery and extortion	92	-	24	116
300	Breaking and entering, fraud, and other offences involving theft	2,473	5,490	12,464	20,427
400	Property damage and environmental offences	70	1,592	1,200	2,862
500	Offences against good order	94	25,840	4,690	30,624
600	Drug offences	201	3,124	1,053	4,378
700	Motor vehicle, traffic and related offences	2	37,806	6,043	43,851
800	Other offences	10	2,409	51	2,470
900	Child welfare matters	-	-	141	141
Total		3,369	78,317	26,708	108,394

(a) Approximately 76,000 complaints were finalised in these Courts during 1984-85. (b) Related to *Draft Australian National Classification of Offences*, June 1980.

THE JURY SYSTEM

The operation of the jury system is governed by the *Juries Act 1957*. Indictable offences are tried before a Judge and twelve jurors sitting in the criminal jurisdiction of either the Supreme Court or District Court, depending on the gravity of the offence. Juries for civil cases comprise six persons.

Eligibility for jury service

Subject to the *Juries Act*, a person who is enrolled on any of the rolls of electors entitled to vote at an election of members of the Legislative Assembly of the Parliament of the State is liable to serve as a juror at trials in the jury district in which he or she is shown to live by any of those rolls of electors.

Each year a Juror's Book is prepared by the Chief Electoral Officer for each jury district within the State in respect of persons who appear to be qualified for, and not otherwise ineligible for service as jurors. Certain persons are excluded from jury service and persons may be excused on the grounds of illness, undue hardship, circumstances of sufficient weight, importance or urgency; or recent jury service.

LAW REFORM COMMISSION OF WESTERN AUSTRALIA

The Law Reform Commission of Western Australia, established by the *Law Reform Commission Act 1972*, examines proposals for review of aspects of the law referred to it by the Attorney General. It may also

submit to the Attorney General proposals for review. The Commission usually issues a discussion paper dealing with the issues involved in a particular proposal under consideration and invites comments from interested persons. A report is then made to the Attorney General.

PARLIAMENTARY COMMISSIONER FOR ADMINISTRATIVE INVESTIGATIONS

The Parliamentary Commissioner for Administrative Investigations (commonly known as the Ombudsman) is empowered under the *Parliamentary Commissioner Act 1971* to investigate complaints by a person or a body of persons (whether incorporated or not) affected by the administrative actions of government departments, specified statutory authorities, and local authorities.

The Act does not apply to Courts of Law in the State, a Judge of the Supreme Court, the Family Court or the District Court, a Commissioner of any Court, a Stipendiary Magistrate, a Coroner, the Auditor General, the Parliamentary Privileges Act, or any decision of the Cabinet or a Minister.

During the year ended 30 June 1986, of the 1,277 complaints processed, 15 were sustained. In 164 cases, complaints were discontinued because they were rectified or settled during investigation. In 717 of the complaints processed some assistance was given to the complainant by way of resolution or clarification.

THE LEGAL PROFESSION

The Barristers' Board has the power to regulate and control the examination of articulated clerks, and the qualification and examination of all candidates for admission as practitioners. Practitioners are also required to obtain a Practising Certificate, renewable annually, from the Board. At 30 June 1986, 1,596 Practising Certificates had been issued in respect of the 1985-86 year.

LEGAL AID COMMISSION OF WESTERN AUSTRALIA

The Legal Aid Commission provides legal assistance to eligible persons throughout Western Australia. The assistance may be made available at no expense to, or wholly or partly at the expense of, the Commission.

During the year ended 30 June 1986 some 58,500 persons sought assistance from the Commission. The duty counsel service, in conjunction with private legal practitioners, assisted some 20,939 persons whilst Legal Advice Bureau staff (duty solicitors) assisted 20,988 persons. Ongoing legal assistance was granted in 10,139 cases from 16,490 applications. Staff lawyers employed by the Commission handled 3,218 of these cases, whilst

\$6.7 million was paid to private legal practitioners for cases undertaken by them.

WESTERN AUSTRALIA POLICE DEPARTMENT

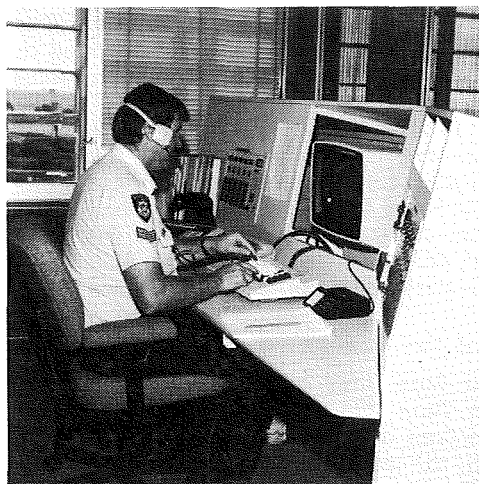
The Western Australia Police Department comprises five main branches under the direction of the Commissioner of Police. The Commissioner is appointed by the Governor and is responsible to the Minister for Police.

The maintenance of public peace and good order, the protection of life and property and the prevention of crime through the apprehension and prosecution of criminals remain the foremost objectives of the Department. However among other things, police officers are asked to be lecturers, computer operators, laboratory technicians, resource managers, disco operators, bankers and marriage counsellors, and also provide assistance to a number of State Government organisations. Table 9.3 indicates the number of crimes reported and cleared during 1985-86.

There were 3,168 officers in the Police Force at 30 June 1986 compared with 2,975 the previous year.

TABLE 9.3 - WESTERN AUSTRALIAN POLICE DEPARTMENT
CRIMES REPORTED AND CLEARED; OFFENDERS: 1985-86

Offence	Number of Crimes		Offenders apprehended		
	Reported	Cleared	Male	Female	Total
Homicide	37	36	37	3	40
Sexual offences excluding rape (assault/sexual)	1,369	790	449	3	452
Rape (assault/sexual)	197	172	78		78
Breaking and entering	29,447	4,936	5,035	496	5,531
Robbery	338	118	107	11	118
Serious assault	998	789	651	71	722
Assault police	378	371	289	48	337
Common assault	3,359	2,486	1,711	250	1,961
Stealing	45,439	11,300	7,105	3,629	10,734
Motor vehicle	9,941	2,387	1,647	98	1,745
Fraud	8,445	5,465	925	471	1,396
Damage	16,194	2,992	2,648	265	2,913
Arson	105	40	37	5	42
Unlawfully on curtilage/premises	2,881	764	917	73	990
Drug	6,262	6,262	4,005	642	4,647
Bomb hoax	209	21	14	11	25
Other indictable offences	356	260	211	37	248
Total	125,955	39,189	25,866	6,113	31,979



THE NEW RADIO CONTROL SYSTEM AT POLICE HEADQUARTERS

The system is a sophisticated computer, radio and television network designed and installed by Communications Branch technical staff.

Photograph: Western Australian Police Department.

PRISONS

The Director of the Prisons Department is responsible, subject to the control of the Minister, for the administration of prisons in Western Australia. Police goals administered jointly by the Prisons Department and the Police Department hold prisoners awaiting trial and some short-term prisoners. In addition, provision is made for holding some prisoners with very short sentences at police lock-ups throughout the State.

TABLE 9.4 - NUMBER OF PRISONERS - DAILY AVERAGES: 1985-86

Institution	Males	Females	Total
Prisons	1,470.4	80.6	1,551.0
Police gaol—			
East Perth	13.6	-	13.6
Police lock-ups	79.5	23.0	102.5
Public hospitals	3.2	0.7	3.9
Total	1566.7	104.3	1,671.0

Work and educational opportunities vary from prison to prison. All prisons employ some prisoners in maintenance, cleaning and cooking tasks, whilst at the larger and better equipped institutions, workshops provide additional employment and trades training including apprenticeships. Prison farms

provide employment and some training in various aspects of agriculture. Full or part-time educational facilities are available at most prisons.

TABLE 9.5 - PRISON RECEIVALS: DISTINCT PERSONS (a) BY AGE: 1985-86

Age (years)	Males	Females	Persons
Under 16	2	-	2
16-17	50	1	51
18-19	595	44	639
20-24	1,227	135	1,362
25-29	786	100	886
30-34	464	71	535
35-39	344	29	373
40-44	174	21	195
45-49	115	9	124
50 and over	143	15	158
Unknown	9	1	10
Total	3,909	426	4,335

(a) Distinct persons refers to the individuals admitted during the period. Data is recorded for the person's first admittance during the period.

PROBATION AND PAROLE SERVICE

TABLE 9.6 - PROBATION AND PAROLE SERVICE YEAR ENDED 30 JUNE 1986

PROBATION	
Number of probation order—	
Current at beginning of period	2,152
Issued during period	1,845
Terminated by compliance	1,274
Terminated - breach action taken	363
Current for all or part of period	4,010
Current at end of period	2,373
Number of persons—	
Under supervision at end of period (a)	2,131
PAROLE	
Number of parole orders (b)—	
Current at beginning of period	741
Issued during the period (c)	543
Terminated as a result of—	
Successful completion	352
Cancellation	148
Current at end of period	784
Number of persons—	
Under supervision during period	1,284

(a) Includes persons subject to interstate orders and Commonwealth Crimes Act bonds. (b) Excludes those released to parole for deportation, extradition or repatriation only. (c) Includes orders for release under supervision, by the Governor in Executive Council.

Probation is an alternative to imprisonment; it consists of the conditional suspension of punishment. Parole is the conditional release of selected prisoners after the offender has served part of the sentence in a penal institution. One of the main functions of the Probation and Parole Service is to provide pre-sentence reports to assist the Court in

coming to a decision as to sentence which is, as far as possible, in the best interests of the community and the offender.

The Parole Board is empowered to release on parole a prisoner who has served a minimum term fixed by a court, or a prisoner being detained at the Governor's pleasure. Parole officers establish contact with prospective parolees during their imprisonment, prepare a case history of each prisoner for the information of the Parole Board, and supervise paroled persons during the parole period.

PUBLIC SAFETY

Industrial Foundation for Accident Prevention

The Industrial Foundation for Accident Prevention is a non-profit organisation and most of its funds are generated by the provision of its services, with the balance made up of member subscriptions and State Government grants. Employers and Government are represented on the Foundation's Management Committee and Advisory Council.

The Foundation provides occupational safety and health services to industry, commerce and Government Departments in Western Australia and other States with the aim of preventing occupational injuries and illness.

The Western Australian Fire Brigades Board

The Board is responsible for taking, superintending, and enforcing all necessary steps for the prevention and extinguishing of fires and the protection of life and property from fire, and the control of all fire brigade premises and all fire brigades.

Of the 11,495 incidents attended by metropolitan and country fire stations in 1985-86, there were 4,036 false alarms, 5,303 fires causing negligible damage and 717 calls for special services including rescue, assistance with hazardous conditions and salvage operations.

Fifteen permanent brigades and two volunteer brigades, one of which is supported by permanent staff, operate in the metropolitan fire district centred on the City of Perth. Permanent brigade personnel serve with volunteer brigade personnel in five large country centres, and volunteer brigades provide town fire protection at seventy-three other centres. At 30 June 1986, the Board had 863 employees and there were 2,027 volunteer brigade officers and firemen.

Bush Fires Board

The Bush Fires Board is constituted under the *Bush Fires Act 1954*. The principal functions of the Board are to administer the Act; to report to the Minister on methods of preventing or extinguishing bush fires; to recommend the prohibited and restricted burning times to be declared for the whole or any part of the State for any yearly period; to carry out research in connection with fire prevention and control; to conduct publicity campaigns for the purpose of improving fire prevention measures; to provide training facilities for volunteers; and to carry out such fire prevention measures as it considers necessary. The Board operates through its staff liaison officers based in country centres. These officers promote fire protection by the exercise of co-ordination, liaison and advisory functions.

Local authorities throughout the State handle local administration of the Bush Fires Act.

REFERENCES

- Western Australian Police Department *Annual Report 1986*.
- Western Australian Prisons Department *Annual Report 1986*.
- Western Australian Fire Brigades Board *Annual Report 1986*.

Chapter 10

EDUCATION

In Western Australia, education at pre-primary, primary and secondary levels is provided at government schools administered and staffed by the Education Department and at non-government schools, most of which are conducted by the principal religious bodies. Technical and further education is offered by the Education Department of Western Australia and by three independent regional colleges. The latter also provide tertiary education facilities. Additionally, tertiary education is available through a multi-campus college of advanced education and three universities.

EARLY CHILDHOOD EDUCATION

Before commencing primary school, a child may attend pre-primary education at either a Government or non-government school. A child may also attend a government pre-school or an independent pre-school run by a parent committee. Attendance is optional at all centres. A year of free voluntary pre-primary education for children aged four and five years has been introduced into the government education system.

Minister for education and all authorised pre-school centres are subject to inspection by an officer of the Education Department.

The Early Childhood Branch of the Education Department is responsible for the co-ordination of early childhood education, the overall administration of pre-primary centres attached to government primary schools, the appointing of staff and the maintenance of advisory services to pre-primary and pre-school centres.

TABLE 10.1 - PRE-SCHOOL EDUCATION : JULY

Particulars	1984	1985	1986
Number of centres—			
Government—			
Pre-primary (a)	460	466	478
Pre-school	159	156	149
Non-government—			
Pre-primary	73	76	82
Independent pre-schools (b)	23	22	20
Total	715	720	729
Number of staff (c)—			
Teachers	628	556	567
Teacher aides	r569	557	570
Total	r1,197	1,113	1,137
Number of children—			
Government—			
Pre-primary	17,499	17,978	19,430
Pre-school	7,754	7,666	7,549
Non-government—			
Pre-primary	1,920	2,096	2,408
Independent pre-school (b)	1,056	1,013	1,000
Total	28,229	28,753	30,387

(a) Schools administering pre-primary facilities including schools with combined pre-primary/primary classes. (b) Centres which are run neither by the Education Department nor by non-government schools. (c) Number of full-time staff plus full-time equivalent units of part-time staff based on proportion of full-time salary paid. From 1985 excludes staff in non-government pre-primary centres.

Every person conducting a pre-school centre is required to hold a permit issued by the

PRIMARY, SECONDARY AND TECHNICAL EDUCATION

Statistics presented in this Chapter are compiled by the Education Department of Western Australia and minor differences occur between these data and statistics published for the National Schools Statistics Collection compiled by the Commonwealth Department of Education, because of minor variations in the concepts, classifications, definitions and coverage of the respective series. Wherever possible, these differences are explained in footnotes to affected statistical tables.

Primary and secondary school students

Table 10.2 gives a classification according to age of students enrolled at government and non-government schools.

Children may commence school at the beginning of the year in which they attain the age of six years. Except in special circumstances attendance is compulsory from the age of six years to the end of the year in which the child attains the age of fifteen years. Instruction in the primary school is provided over a seven-year period. A child

TABLE 10.2 - GOVERNMENT AND NON-GOVERNMENT SCHOOLS, FULL-TIME STUDENTS CLASSIFIED ACCORDING TO AGE (a) JULY 1986

Age last birthday (years)	Government schools	Non-government schools (b)	Total
Under 6	8,756	1,995	10,751
6	18,006	4,251	22,257
7	18,145	4,407	22,552
8	18,625	4,426	23,051
9	18,223	4,455	22,678
10	18,639	4,568	23,207
11	18,572	4,716	23,288
12	17,876	5,785	23,661
13	18,336	6,411	24,747
14	19,428	6,503	25,931
15	16,762	5,907	22,669
16	10,115	4,430	14,545
17	4,694	2,145	6,839
18 and over	1,249	212	1,461
Total	207,426	60,211	267,637

(a) Excludes children attending pre-school centres and children attending pre-primary grades in other schools. Includes Education Support Branch schools and special classes. Excludes technical schools and colleges. (b) Excludes students at schools not in scope of the State Education Act but in scope of the National Schools Statistics Collection.

who makes normal progress completes the course at the age of twelve years and may then enter high school. The Education Support Branch provides assistance to handicapped children and Senior Colleges provide secondary education for those people who have left the school system before achieving their goals.

The Secondary Education Authority approves courses of study and issues certificates recording student achievement in secondary education in Western Australia. A Certificate of Secondary Education recording achievement is issued to each student when they leave school. Details of the Secondary Education Authority are to be found later in this Chapter.

Primary and secondary curricula. The curricula of both the primary and secondary schools are organised into seven study areas: English, Languages and Communication; Mathematics; Science and Technology; Social Studies; Practical and Creative Arts; Personal and Vocational Education; and Physical Education. From the beginning of primary school to the end of Year 10, all students study at least one subject from each of the seven study areas each year.

TABLE 10.3 - GOVERNMENT SCHOOLS: JULY

Particulars	1984	1985	1986
NUMBER OF SCHOOLS			
Primary schools	534	532	531
Education Support Branch schools	40	53	51
District high schools	58	58	59
High schools	7	4	4
Senior high schools	74	79	80
Senior colleges	2	2	2
Distance Education Centre (a)	-	-	1
Total	715	728	728
NUMBER OF TEACHING STAFF (b)			
Engaged in teaching duties—			
Primary (c)	6,615	6,688	6,730
Secondary	5,710	5,849	5,995
On special duties	533	577	611
On leave—			
Paid	179	176	408
Unpaid	837	1,088	1,285
Total	13,874	14,378	15,029
Males	6,131	6,187	6,318
Females	7,743	8,191	8,711
NUMBER OF FULL-TIME STUDENTS (d)			
Grade of education—			
Primary (c)	133,279	130,549	130,889
Secondary—			
Years 8, 9 and 10	56,442	56,711	55,235
Years 11 and 12	17,289	18,498	19,703
Senior colleges	1,014	1,044	894
Ungraded or special classes	1,024	763	705
Total	209,048	207,565	207,426
Males	108,213	107,456	107,067
Females	100,835	100,109	100,359

(a) Provides pre-school to year 12 curriculum and supports students who cannot receive an education in the traditional classroom because of isolation, itinerant parents or for social or medical reasons. (b) Includes the number of full-time teachers plus full-time equivalent units of part-time teachers based on proportion of full-time salary paid. Excludes persons teaching pre-primary grades. (c) Includes Education Support Branch schools. (d) Excludes students enrolled in pre-primary grades.

The figures shown under the heading 'On special duties' represent teachers engaged in activities associated with the specialist branches of the Department, and include all advisory staff referred to above.

Advisory teachers working from the central and regional offices and specialist teachers based in schools, assist teachers in art and crafts, physical education, music, speech, drama, science, English, social studies and mathematics.

To ensure a general and balanced education throughout Years 8 to 10, the minimum required time of study in each of the study areas is specified. Those Year 10 students proceeding to Year 11 tailor their studies in preparation for upper school and those

students planning to leave school at the end of Year 10 devote increasing amounts of time to vocationally orientated subjects.

Education in government schools is secular in character but periods may be set aside during which representatives of various religious denominations may attend to give special religious instruction. In addition, elements of religion may be included, in one or more of the seven study areas, by individual teachers.

A wide range of equipment and support is available to schools and school age students. Audio visual equipment such as projectors, television sets and sound reproduction systems are placed in all schools. Most secondary schools have video recording equipment which is also supplied to remote and other disadvantaged schools. Student counselling is available to pre-primary children and school age students and their parents, and career guidance is provided to secondary school students.

Assistance is provided to handicapped children in the form of Education Support Branch schools, centres and units for physically handicapped, hospitalised and intellectually handicapped children. A kindergarten and junior school for deaf children is maintained and classes are conducted for older students.

Although Aboriginal children normally work in the mainstream education program, practically orientated courses are offered when needed. The Aboriginal Education Branch is involved in the formulation of policy, the identification of curriculum strategies, the production of suitable learning materials and the provision of supplementary funding and advisory assistance to teachers of Aboriginal children.

Agricultural education in the form of full-time residential courses is available at a number of centres. Day instruction is also provided at a number of high schools. Some private schools offer courses in agriculture.

Technical and further education

The Technical and Further Education Division of the Education Department is the main provider of technical and further education (TAFE) in Western Australia, although three independent colleges also offer

these facilities (details of their operations are shown later in this Chapter).

The Technical and Further Education Division trains managers, supervisors, technicians, skilled tradesmen, professionals and para-professionals, semi-skilled personnel and other kindred support staff required by industry and commerce.

The Division also provides programs alternative to those of the upper secondary school. These include vocationally related courses, and bridging and second-chance courses for young people from fifteen to nineteen years of age. Further services are cultural, recreational and leisure programs for the adult population, and specialist and mid-career or re-training programs in a wide variety of forms.

TABLE 10.4 - TECHNICAL AND FURTHER EDUCATION

Particulars	1984	1985	1986
NUMBER OF INSTITUTIONS			
Colleges	16	16	16
Evening technical schools	8	8	8
Technical centres	93	85	70
NUMBER OF TEACHING STAFF (a)			
Colleges	1,577	1,604	1,736
Evening technical schools	65	69	78
Technical centres	107	83	100
NUMBER OF STUDENT ENROLMENTS (b)			
Colleges	68,613	67,151	77,084
Evening technical schools	30,864	29,863	39,144
Technical centres	20,028	18,702	23,886

(a) Full-time equivalent. (b) Includes only those students who attend at least one class or in the case of external students, returned at least one assignment. Each student is counted once only, even though they may have enrolled in more than one course of study or on more than one occasion. Students enrolled in Adult Education (hobby courses) are counted on each occasion on which they enrol.

The Technical and Further Education Division has developed a variety of ways to make its programs accessible to students. It has sixteen technical colleges, thirteen in the metropolitan area and three in the country. These offer a wide range of day and evening courses although each has developed its own special areas of study.

The Division's eight evening technical schools make use of local community facilities including high schools, community halls, company premises and old buildings. Though some day-time classes are available, evening technical schools cater mainly for

part-time evening students. There are technical centres distributed throughout country and metropolitan areas. Making use of a variety of facilities, these centres serve the needs of local communities by providing classes whenever there are sufficient students and staff.

External studies are available through the Division's Technical Extension Service for students who, because of remoteness or individual limitations (such as physical disabilities) are unable to attend courses at established centres.

A rural co-ordination scheme operated by the Division brings together expertise and resources in a number of local communities. This has resulted in many useful programs of immediate relevance to these communities and offers greater access than is available through technical centres and the Technical Extension Service.

Short intensive courses to meet vocational, small business management and specific industrial training and retraining needs are conducted as required in various locations including company sites.

A counselling service provides educational, vocational and general guidance to students and prospective students of the Division. It also provides limited consultative services to industry and commerce on the subjects of staff selection, training, evaluation and related matters.

The Division co-operates with the Commonwealth Departments of Immigration and Ethnic Affairs, and Education to provide courses in the English language for adult migrants. It also conducts an Aboriginal Access Program which, although designed mainly to develop literacy in English among Aboriginal people, includes classes in community obligations, home skills, employment skills and leisure-time activities.

NON-GOVERNMENT SCHOOLS

The non-government schools, which are conducted mainly by religious organisations, provide education from pre-school to the end of secondary school. The curriculum at the primary and secondary levels is substantially the same as that in the government schools, and covers the same number of years.

Schools, teachers and students

TABLE 10.5 - NON-GOVERNMENT PRIMARY AND SECONDARY SCHOOLS: JULY
(Source: National Schools Statistics Collection)

Particulars	1984	1985	1986
NUMBER OF SCHOOLS			
Anglican	8	8	9
Catholic	143	145	148
Other	70	71	76
Total	221	224	233
NUMBER OF TEACHING STAFF (a)			
Anglican	426	453	494
Catholic	2,191	2,268	2,374
Other	685	735	793
Total	3,301	3,454	3,661
NUMBER OF FULL-TIME STUDENTS			
Anglican	5,963	6,215	6,698
Catholic	40,376	41,368	42,689
Other	9,516	10,105	10,868
Total	55,855	57,688	60,255
Grade of education—			
Primary	29,943	30,528	31,828
Secondary - years 8, 9 and 10 (b)	18,301	18,965	19,618
Years 11 and 12	7,494	8,094	8,726
Special	117	101	83
Total	55,855	57,688	60,255
Males	27,750	28,652	30,035
Females	28,105	29,036	30,220

(a) Includes the number of full-time teachers plus full-time equivalent units of part-time teachers based on the proportion of full-time hours worked. Discrepancies may occur between sums of components and totals due to rounding. (b) Includes students in ungraded classes.

SECONDARY EDUCATION AUTHORITY

The Secondary Education Authority is responsible to the Minister for Education for the accreditation and registration of courses of study for Years 9 to 12; the moderation of school assessments to ensure comparability among schools; the issue of certificates of achievement; and the administration and conduct of the Tertiary Entrance Examination. The Tertiary Entrance Score is calculated as an average of the students best three, four or five subject scores which consist of the external examination results and moderated school assessments.

POST-SECONDARY EDUCATION

Post-secondary education in Western Australia is provided through the three Universities (Murdoch University, the University of Western Australia and Curtin University of

Technology), the Western Australian College of Advanced Education, the Hedland, Kalgoorlie and Karratha Colleges and the technical colleges and centres of the Education Department.

Administration fee. For 1987 the Commonwealth Government introduced the requirement of an administration fee of \$250 for each student undertaking award or non-award university and advanced education courses. The fee, collected by the institutions, will be adjusted in later years for administrative cost variations. Commonwealth financial assistance for universities and colleges of advanced education will be reduced on a pro-rata basis as a consequence of this charge. The impact of the fee on education participation and the adequacy of exemption and allowance provision for cases of hardship were to be assessed during 1987.

THE WESTERN AUSTRALIAN POST-SECONDARY EDUCATION COMMISSION

The Western Australian Post-Secondary Education Commission advises the Government, post-secondary education institutions and the Commonwealth Tertiary Education Commission on the planning, co-ordination, development and financing of post-secondary education.

THE TERTIARY INSTITUTIONS SERVICE CENTRE (INCORPORATED)

The Tertiary Institutions Service Centre (Incorporated) processes applications for admission to the institutions and carries out such other functions as agreed by the institutions.

Applicants seeking admission to a first year undergraduate course (or later years in the case of Murdoch University and Curtin University) or to a Diploma in Education course apply through a joint system operated by the Centre. Applicants list four preferences from all the tertiary courses available and offers are then made by the institutions for each course on the basis of a ranked order.

THE COLLEGES

Multi-level post-secondary education colleges may be established by the Minister for Education, on the advice of the Western Australian Post-Secondary Education Commission. Such colleges may, with the Minister's approval, provide advanced education, technical and further education, and education at other levels in specified circumstances.

Hedland College and Karratha College are situated in the Pilbara region in the north-west of the State and Kalgoorlie College is situated in the Eastern Goldfields region in the south-east of the State. Hedland College and Karratha College provide courses mainly in the technical and further education sector, but also provide higher education for local students in co-operation with institutions based in the Perth metropolitan area. Kalgoorlie College provides courses in the technical and further education sector and, under contract to Perth-based institutions, courses in the advanced education sector of post-secondary education. These colleges provide a focus for educational and cultural activities within their respective communities. In addition to academic subjects, the colleges also provide personal interest courses.

WESTERN AUSTRALIAN COLLEGE OF ADVANCED EDUCATION

Five metropolitan colleges (Churchlands, Claremont Teachers, Joondalup, Mount Lawley and Nedlands) and the Bunbury Institute of Advanced Education combine to form the Western Australian College of Advanced Education with each as a campus. In April 1986 the total enrolment was 10,651 comprising 4,749 full-time, 4,509 part-time and 1,393 external students.

The College offers programs of tertiary study leading to awards up to the level of Master's degree.

The organisational structure is based on the five schools of Arts and Applied Sciences, Business, Community and Language Studies, Education, and Nursing. The Western Australian Academy of Performing Arts consisting of the School of Dramatic Arts and the Western Australian Conservatorium of Mu-

sic is also incorporated as a school in the College.

Western Australian Academy of Performing Arts

The Academy of Performing Arts enjoys a wide and semi-autonomous brief in the Western Australian College, though administratively it is a school of the College, and has access to its resources and facilities.

The Academy provides for the preparation of aspiring professionals who seek full-time employment in the performing arts, in-service training of practising professionals in the performing arts in Western Australia and servicing of the performing arts needs of the Western Australian community at large.

Courses within the Academy are planned in such a way that all students have the opportunity to integrate their professional development in their chosen area through both course work and performance, and to study other aspects of the performing arts.

In addition to providing formal courses for its students, the Academy serves the Western Australian community at large in a variety of ways. Music centres are established at Hedland College, Kalgoorlie College and Esperance. In the areas of dance, music and theatre, the Academy offers frequent in-service and professional refresher programs, both on campus and through-out selected centres in Western Australia.

In 1986 the Academy had approximately 290 full-time students and some 110 part-time students enrolled in its music, theatre, dance, arts management and media performance programs.

The initial report which led to the formation of the Academy suggested that the institution should liaise with and utilise resources of related institutions in Western Australia. To support this proposal, Academy students currently undertake courses with Perth Technical College. In turn, students from other tertiary institutions attend open classes taught by Academy staff and a close affiliation has been established with the University of Western Australia. Students in the dance and theatre programs have substantial contact with professional companies such as the Western Australian Theatre Company, the West Australian Ballet Company and the Western Australian Opera Company. Perfor-

mance opportunities with these companies enable students to work with professionals in large scale public productions as part of their training programs.

THE UNIVERSITY OF WESTERN AUSTRALIA

An applicant for admission to the University is required to take subjects at the Tertiary Entrance Examination selected in accordance with the matriculation regulations of the University of Western Australia, and to obtain a sufficiently high score to gain a place in a course. The marks included in the score must normally have been obtained in a single year. Individual faculty prerequisites must also be satisfied and school-leaver applicants must complete the requirements for secondary graduation.

Entry may also be offered to an applicant who has satisfied the admissions requirements of another university in Australia or of an overseas university in which there is a reasonable correspondence between the admission requirements and those of the University of Western Australia.

The regulations also provide that persons of at least twenty years of age may be admitted to a degree course if they are able to demonstrate that there is a reasonable prospect of their being able to assimilate and benefit from their course.

Degrees

Bachelor degrees vary between three and six years duration, some requiring successful completion of the first year course of another faculty for admission and others the completion of a first degree course. Honours degrees generally entail an additional year of study. Masters and Doctors degrees are conferred in a number of disciplines. A post graduate Diploma in Education is also available.

University government

The Senate is the governing authority of the University and is responsible, subject to the *University of Western Australia Act 1911* and the statutes of the University, for the entire control and management of the University. Statutes approved by the Senate are submitted to Convocation for its consideration, but although Convocation may suggest

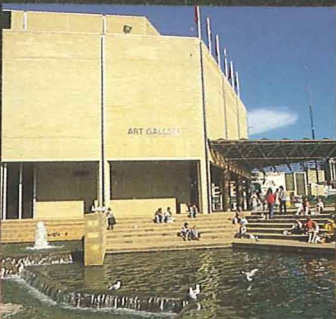
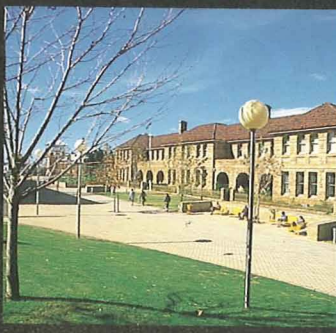
Perth Cultural Centre

The Perth Cultural Centre houses the Art Gallery of Western Australia, the Western Australian Museum, the Perth Institute of Contemporary Arts and the State Library Service in the Alexander Library Building. The Department for the Arts is also housed in the Alexander Library Building.

The Centre faces onto a public mall, which provides a pedestrian link to the cultural facilities, an open area for outdoor cultural activities, and is now linked to the city by walkways extending from the Forrest Place development.

A prominent feature of the open area is the display of some major sculptures. These are Adam, August Rodin, circa 1876-1880 cast in 1974 and acquired in 1977 by the Western Australian Art Gallery through public funds provided by the Western Australian Government; Reclining Figures, Henry Moore (1956 original) purchased 1963; Der Fuefer (The Caller), Gerhard Marcks, 1967 presented by CSR Ltd, 1980; Gate 2: Coalesce, Akio Makigawa, 1987, which was commissioned by the State Library Service of Western Australia.

Photographs: Australian Overseas Information Service





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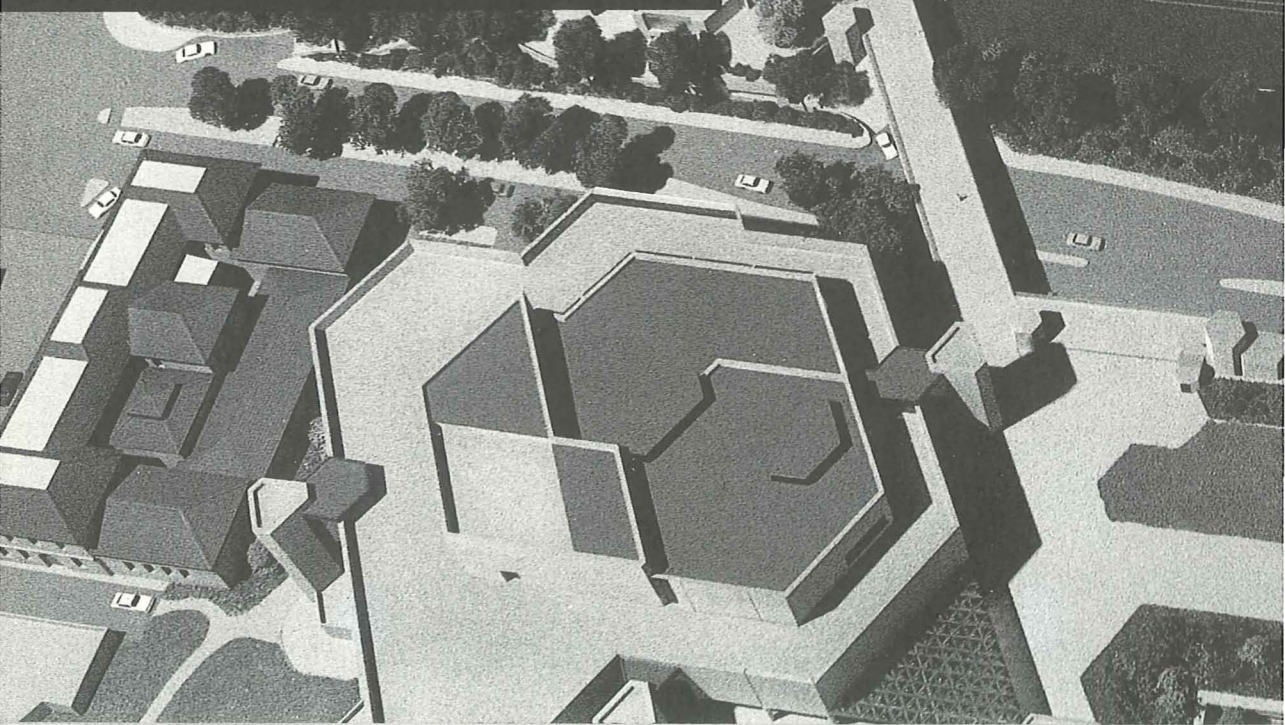
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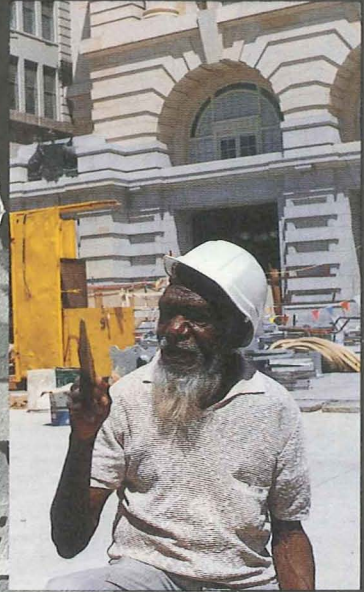
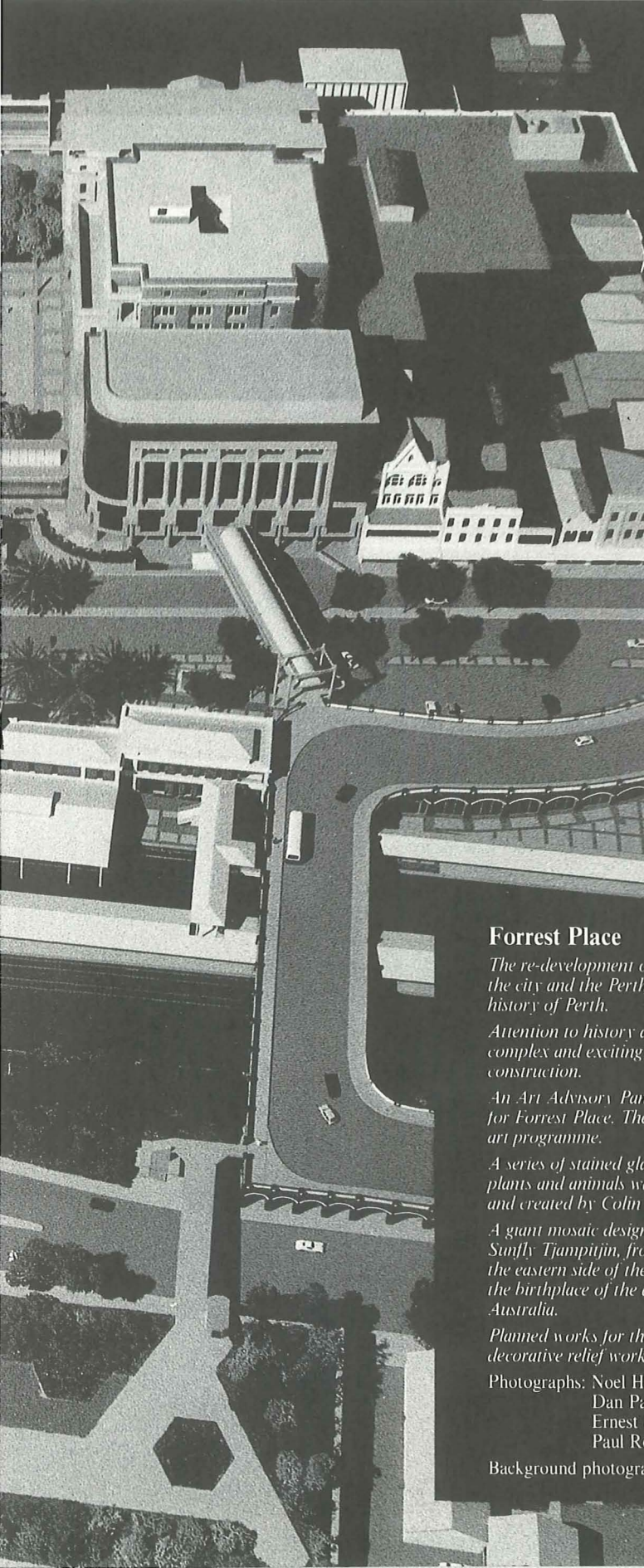
1 Artist, Robert Juniper, and stained glass artisan, Colin Montfort. A section of their Forrest Place work can be seen in the background.

2 Detail from stained glass window, showing Western Australia's fauna emblem, the numbat.

3 Aboriginal artist, Sunfly Tjampitjin, on site at Forrest Place examining the location in which the mosaic featuring his work will be constructed.

4 Painting by Sunfly Tjampitjin on which the mosaic design is based.





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Forrest Place

The re-development of the Forrest Place-City Station area linking the city and the Perth Cultural Centre is a significant episode in the history of Perth.

Attention to history and to contemporary design has produced a complex and exciting juxtaposition of the old and the new in this construction.

An Art Advisory Panel was formed to commission suitable works for Forrest Place. The Panel has established a Trust to help fund the art programme.

A series of stained glass panels featuring Western Australia's native plants and animals was designed by leading artist Robert Juniper and created by Colin Montfort for the Forrest Place complex.

A giant mosaic designed by Western Australian Aboriginal artist, Sinfly Tjampitjin, from Balgo Hills, forms a circular stage floor on the eastern side of the centre. The commissioned work represents the birthplace of the artist in the remote north-east of Western Australia.

Planned works for the centre include sculptures, murals and decorative relief work for walls and walkways.

Photographs: Noel Holly
Dan Palmer
Ernest Polis
Paul Rossen

Background photograph: Perth City Council

Philip Salom

- 1** Born in 1950, Philip Salom has published three collections of poetry to considerable critical acclaim, both nationally and internationally. *The Silent Piano* (1980); *The Projectionist* (1983); and *Sky Poems* (1987), which won the Commonwealth Poetry Prize for the best volume of poetry published in a Commonwealth country, and also won the Western Australia Week Literary Award for poetry.

Photograph: Roger Garwood

Elizabeth Jolley

- 2** Multi-award winning Western Australian writer Elizabeth Jolley began her publishing career in 1980. Since that time, her stories and articles have been widely published in Australia, Britain and America.

In addition to her many publications, (seven novels, three collections of short stories, as well as published plays and poetry) Elizabeth Jolley is currently negotiating sale of the rights of some of her works for film production. She is also writing the screenplay for her novel, *The Well*. Recent major awards for her work include: Miles Franklin Award, *The Well* (1987); Officer of the Order of Australia (AO) for services to Australian Literature (1988).

Photograph: Simon Cowling

Jack Davis

- 3** Born in 1917 in Western Australia, internationally acclaimed Aboriginal poet and playwright Jack Davis, has brought Australian Aboriginal writing to the world.

Davis has received a number of prestigious awards for his work, both as a writer and as someone who has contributed greatly to the development of Aboriginal theatre and literature. Some of his more recent achievements are: British Empire Medal and Western Australian Literary Prize (1987); B.H.P. Award for Excellence (1988).

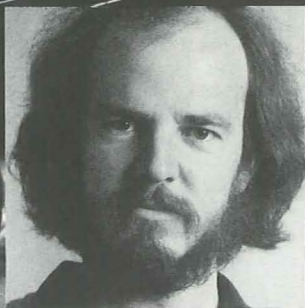
Photograph: John Witfield-King

Tim Winton

- 4** Born in 1960, Western Australian writer Tim Winton emerged in 1981 with *An Open Swimmer*, for which he was awarded the combined Australian/Vogel Award. His second novel, *Shallows*, won the prestigious Miles Franklin Award in 1984, securing him a place in Australia's literary history.

Winton has continued to attract critical acclaim. In 1988, the Literary Arts Board of the Australia Council awarded Winton a Writers Fellowship, and he received a second Western Australian Week Award.

Photograph: Victor France.



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TABLE 10.6 - THE UNIVERSITY OF WESTERN AUSTRALIA: AT 30 APRIL

Particulars	1984	1985	1986
NUMBER OF STAFF			
Teaching—			
Full-time—			
Professors	69	70	71
Associate professors, readers	87	89	92
Senior lecturers	203	201	191
Lecturers, teaching registrars	123	132	126
Other (a)	117	112	106
Total	599	604	586
Part-time (b)—			
Lecturing	14	11	8
Tutoring/demonstrating	72	74	67
Total	86	85	75
Research—			
Full-time	190	211	221
Other—			
Full-time	1,382	1,370	1,388
Part-time (b)	128	122	140
Total staff	2,385	2,392	2,410
NUMBER OF STUDENTS			
Internal—			
Full-time	6,768	6,702	6,704
Part-time	2,981	2,700	2,739
External	61	63	69
Total	9,810	9,465	9,512
Males	5,531	5,294	5,187
Females	4,279	4,171	4,325

(a) Assistant lecturers, teaching fellows, tutors and demonstrators. (b) Figures for part-time staff have been converted to a full-time equivalent on the basis of 250 hours per annum for lecturers, 700 hours per annum for tutors and demonstrators and 35 hours per week for all other staff.

TABLE 10.7 - THE UNIVERSITY OF WESTERN AUSTRALIA

Particulars	1986
NUMBER OF STUDENTS WHO COMPLETED COURSES (a)	
Field of study (b)—	
Agriculture, animal husbandry	55
Architecture, building	28
Arts, humanities and social science	488
Business administration, economics	317
Education	202
Engineering, surveying	143
Health	129
Law, legal studies	176
Science	478
Total	2,016
DEGREES CONFERRED	
Bachelors	1,183
Honours	318
Masters	147
Doctors (c)	61

(a) Year ended 30 June. (b) Comparable data for previous years is not available because of alterations to the fields of study. (c) Includes 3 higher doctorates.

amendments the Senate is not bound to accept them. The Act requires that statutes shall be submitted to the Governor for approval, after which they have the force of law.

The Guild of Undergraduates is constituted under the Act as a voluntary association of the University students 'for furthering of their common interests, and shall be the recognised means of communication between the students and the governing authority of the University'. The government of the student Guild is vested in its Council, to which members are elected in accordance with regulations made by the Guild.

TABLE 10.8 - THE UNIVERSITY OF WESTERN AUSTRALIA—FINANCE (\$'000)

Particulars	1984	1985	1986
INCOME			
Commonwealth Government Grants—			
Specific capital purposes (a)	2,062	373	520
Other	68,713	72,765	79,031
State Government grants	1,344	1,490	1,825
Donations and endowments	7,292	9,619	13,104
Other	6,034	6,908	7,866
Total	85,445	91,155	102,346
EXPENDITURE			
Teaching and research	59,251	63,114	69,333
Administration and general overhead	8,369	9,166	10,433
Libraries	4,756	4,930	6,680
Buildings, premises, grounds	7,587	6,706	8,675
Sundry auxiliary expenditure	3,653	3,433	3,911
Total	83,616	87,349	99,032

(a) Income received specifically for new buildings, major alterations and additions to buildings, installation of services, purchase of land and buildings and major equipment.

Student fees, allowances and scholarships

All students of the University, except those who are also full-time staff members, must pay an annual Guild subscription or donate the equivalent amount to an authorised charitable body. In addition all students are required to pay an annual administration fee of \$250. Financial assistance is given to students by the Commonwealth Government under the Tertiary Education Assistance Scheme and by means of postgraduate awards, to which reference is made later in

this Chapter. In addition, the University makes awards of research studentships for postgraduate study to eligible students. Graduates may also apply for Hackett Studentships for overseas study. Some large private industrial concerns also make awards for study at postgraduate level.

Colleges and hall of residence

There are five residential colleges within the University. Four of the colleges: Kingswood, St Columba, St Thomas More and St George's take both men and women, and the fifth, St Catherine's, is a non-denominational college for women students.

Currie Hall is a non-denominational hall of residence for men and women students.

Research

Some \$18.5 million were spent on research at the University during 1986. This sum comprised funds provided by the Commonwealth Government through the Tertiary Education Commission, grants from agencies such as the Australian Research Grants Committee and the National Health and Medical Research Council, and bequests and benefactions from private industry and members of the public.

University Extension

University Extension is responsible for community education activities, of which the annual Summer School, with a long tradition, is an important component.

MURDOCH UNIVERSITY

Murdoch University is established under the provisions of the *Murdoch University Act 1973*.

Admissions

Murdoch University has a flexible policy concerning admissions. In determining the eligibility of a prospective student, consideration is given to examination results, information obtained from school reports, the results of selection tests and interviews with applicants.

Staff and students

Table 10.9 shows particulars of staff and students.

TABLE 10.9 - MURDOCH UNIVERSITY: AT 30 APRIL

Particulars	1984	1985	1986
NUMBER OF STAFF			
Teaching—			
Full-time—			
Professors	18	18	22
Associate professors, readers	17	19	23
Senior lecturers	50	58	60
Lecturers, teaching registrars	53	47	59
Other (a)	42	46	44
Total	180	188	208
Part-time (b)—			
Lecturing	1	1	1
Tutoring/demonstrating	14	16	19
Total	15	17	20
Research—			
Full-time	9	10	14
Other—			
Full-time	424	447	462
Part-time (b)	8	13	11
Total staff	636	675	715
NUMBER OF STUDENTS			
Internal—			
Full-time	1,544	1,697	2,050
Part-time	844	877	1,029
External	1,163	1,413	1,545
Total	3,551	3,987	4,624
Males	1,726	1,912	2,221
Females	1,825	2,075	2,403

(a) Assistant lecturers, teaching fellows, tutors and demonstrators. (b) Figures for part-time staff have been converted to a full-time equivalent on the basis of 250 hours per annum for lecturers, 700 hours per annum for tutors and demonstrators and 35 hours per week for all other staff.

Schools of study

The University is organised on the basis of schools of study which have both academic and administrative responsibilities. The following schools are established: Biological and Environmental Sciences; Economics and Commerce; Education; Humanities; Mathematical and Physical Sciences; Social Inquiry; and Veterinary Studies.

Degrees

Bachelor degrees are between three and five years duration. Honours degrees when available require a further year of study. Masters and Doctors degrees are also available.

External studies

Special provision has been made for external students, and a substantial and innovative program of external studies has been developed. External tuition is the responsibility of staff of the schools of study, but

TABLE 10.10 - MURDOCH UNIVERSITY

Particulars	1984	1985	1986
NUMBER OF STUDENTS WHO COMPLETED COURSES (a)			
Field of study—			
Education	96	107	113
Biological and environmental sciences	68	68	59
Humanities	48	45	30
Mathematical and physical sciences	26	37	35
Social inquiry	97	100	109
Veterinary studies	91	105	93
General studies	4	6	7
Total	430	468	446
DEGREES CONFERRED			
Bachelors	275	336	307
Honours	70	64	66
Masters	28	11	31
Doctors	10	7	16

(a) Year ended 30 June.

the external studies program as a whole is co-ordinated by a Director of External Studies.

Extension service

The University provides, by co-operation with University Extension, community education programs for all ages.

University government

The governing body of the University is the Senate consisting of twenty-five members. Under the Murdoch University Act the Senate has established an Academic Council, its principal functions being 'the discussion and submission to the Senate of opinions and recommendations on academic policy, academic development, the admission of students, instruction, studies and examination, research, the admission to degrees, the discipline of the University and any other matters which in the opinion of the Academic Council are relevant to the objects of this Act'.

The Murdoch University Guild of Students, a voluntary organisation, is the recognised channel of communication between the students and the Senate. The Guild provides a wide range of services, entertainment and alternative activities to academic life on the campus.

TABLE 10.11 - MURDOCH UNIVERSITY—FINANCE (\$'000)

Particulars	1984	1985	1986
INCOME			
Commonwealth Government Grants—			
Specific capital purposes (a)	1,348	2,182	5,923
Other	21,091	23,936	27,684
State Government grants	377	556	551
Donations and endowments	68	165	68
Other	1,471	2,288	2,566
Total	24,355	29,127	36,792
EXPENDITURE			
Teaching and research	14,155	16,264	19,004
Administration and general overhead	3,284	3,920	4,633
Libraries	1,851	2,013	2,240
Buildings, premises, grounds	2,639	3,136	8,108
Sundry auxiliary expenditure	2,139	2,921	2,998
Total	24,068	28,254	36,983

(a) Income received specifically for new buildings, major alterations and additions to buildings, installation of services, purchase of land and buildings and major equipment.

Student fees, allowances and scholarships

All students of the University pay an administration charge of \$250 and an annual Guild fee.

Financial assistance is given to students by the Australian Government under the Tertiary Education Assistance Scheme and by means of postgraduate awards. The University offers postgraduate scholarships and private organisations also offer awards for postgraduate studies.

Student housing

The University has on campus accommodation for 96 students. Student House provides self service accommodation with each student having a single study/bedroom. Groups of eight students share common kitchen, dining and lounge areas. The University's Melville Centre offers collegiate style accommodation for a further 60 students and 30 students are accommodated in units in the locality of Kardinya, within walking distance of the main campus.

Research

Various government authorities and private organisations provided \$8 million for basic and applied research during 1986. The University's development company, Murmin is involved in an \$11 million research and

development joint agreement with an American corporation to develop a zinc bromine battery.

The Mineral Chemistry Research Unit receives grants from private enterprise to continue research into minerals processing and related fields of chemistry. The University has received substantial funding for solar energy research from both State and Federal sources.

The University also has an Institute for Social Program Evaluation, an Institute for Environmental Science, a Foundation for Continuing Veterinary Education and a Foundation for Companion Animals.

CURTIN UNIVERSITY OF TECHNOLOGY

The Curtin University of Technology, formerly the Western Australian Institute of Technology is established under provisions of the *Curtin University of Technology Act 1966*. This legislation was passed in December 1986 and became effective on 1 January 1987. The University is responsible for technologically and clinically based programs in academic areas such as chemical engineering, mining engineering, surveying, film and television, information and library studies, pharmacy and medical technology, local government and secretarial administration.

Staff and students

Table 10.12 shows particulars of teaching staff and students.

University government

The administration of the University is vested in a council of 18 members made up of representatives of the community, the University staff, the Education Department and the Student Guild.

The Student Guild is an association for the mutual advantage of students. It provides a balance of educational, social, recreational and cultural pursuits and is an integral part of the University community.

Courses

The University conducts courses leading to associate diploma, diploma, bachelor's degree, graduate and postgraduate diploma, master's degree or PhD qualifications. The

TABLE 10.12 - CURTIN UNIVERSITY OF TECHNOLOGY: AT 30 APRIL

Particulars	1984	1985	1986
NUMBER OF TEACHING STAFF			
Full-time—			
School and department heads	53	56	55
Senior lecturers	158	149	146
Lecturers	264	276	301
Assistant lecturers, tutors, demonstrators, etc.	85	74	82
Total full-time	560	555	584
Part-time (a)	125	124	151
NUMBER OF STUDENTS IN APPROVED COURSES			
Internal—			
Full-time	5,622	5,960	6,206
Part-time	4,988	4,931	5,277
External	1,188	1,131	1,103
Total	11,798	12,022	12,586
Males	6,853	6,860	6,969
Females	4,945	5,162	5,617

(a) Full-time equivalent units of part-time teachers based on number of hours worked.

courses vary in duration according to the level and may be undertaken as full-time or part-time studies. It is also possible to study some courses on an external (correspondence) basis. Minimum entrance requirements for undergraduate courses are based on Tertiary Entrance Examination external scores. Holders of other qualifications which are assessed as equivalent to the Tertiary Entrance score, and with evidence of adequate literacy may be considered for selection. Mature Age provisions provide for alternative assessment methods for applicants at least twenty years of age.

The teaching work of the University is organised under four Divisions namely Arts, Education and Social Sciences; Business and Administration; Engineering and Science; and Health Sciences; and two Branches: Muresk Institute of Agriculture and the Western Australian School of Mines.

The principal campus at Bentley includes the administrative centre and a wide range of teaching facilities. Specialist campuses are located at Kalgoorlie and Collie for mining and related courses, at Muresk for agriculture courses and at Shenton Park for occupational therapy, physiotherapy, and podiatry courses.

TABLE 10.13 - CURTIN UNIVERSITY OF TECHNOLOGY

Particulars	1984	1985	1986
NUMBER OF STUDENTS WHO COMPLETED COURSES			
Field of study—			
Agriculture	56	66	47
Architecture	114	110	105
Arts	490	408	430
Business Studies	528	544	513
Education	332	318	298
Engineering	176	235	219
Health	434	517	599
Science, Pure and Applied	185	204	203
Total	2,315	2,402	2,414
DEGREES CONFERRED			
Bachelors	1,575	1,622	1,467
Masters	51	64	53

Finance**TABLE 10.14 - CURTIN UNIVERSITY OF TECHNOLOGY—FINANCE (\$'000)**

Particulars	1984	1985	1986
INCOME			
Commonwealth Government Grants—			
Specific capital purposes (a)	502	448	587
Other	52,684	56,351	62,902
State Government grants	-	1,434	3,853
Donations and endowments	484	853	842
Other	11,673	11,791	16,362
Total	65,343	70,877	84,546
EXPENDITURE			
Salaries and wages	39,416	44,862	50,290
Library	526	808	938
Buildings, grounds and equipment	5,612	5,588	5,395
Sundry auxiliary expenditure	17,454	16,572	24,758
Total	63,008	67,830	81,381

(a) Income received specifically for new buildings, major alterations and additions to buildings, installation of services, purchase of land and buildings and major equipment.

Western Australian School of Mines

The Western Australian School of Mines comprises the Departments of Mineral Exploration and Mining Geology, Minerals Engineering and Extractive Metallurgy and Mining Engineering and Mine Surveying. Associate diploma, bachelor's degree, post-graduate diploma and master's degree courses are offered.

The increasing emphasis on applied research and consultancy within the School led to the establishment of the Brodie-Hall Mining

Research and Consultancy Centre in 1986, which is currently funding the appointment of a Research Fellow in the field of mining geophysics.

The Collie Federated School of Mines is also a campus of the Curtin University of Technology. The development of teaching and research facilities at Collie will consolidate the role of the School and expand its base as a South-West Regional/Bentley Campus research centre.

In April 1986 there were 217 students enrolled in the Western Australian School of Mines.

Muresk Institute of Agriculture

Muresk Institute of Agriculture which comprises the Departments of Animal Production, Farm Management and Farm Mechanisation, and Plant Production, is situated near Northam. Muresk offers a range of courses which allows its graduates to fill almost any role in the rural industry. The Associate Diploma in Agriculture, a two year course is for those planning a career in farming or areas related to farming. The Bachelor of Business (Agriculture) is a three and a half year course for those wishing to pursue a position in management in one of the rural associated industries, or to manage a large scale farming enterprise.

The campus of some 1,800 hectares contains a cereal and sheep farm, a piggery, and a thoroughbred horse stud. Research facilities include laboratories, glass and tunnel houses and the Clyde Smith Rural Management Centre which houses the Rural Management Unit and its wide range of microcomputer hardware and software. Through this unit and with the establishment of the Farm Management Foundation of Australia (Inc) on the campus, Muresk has expanded its applied research profile in the agricultural business field. This research concentrates on the development and application of new technologies in both broadacre and intensive farming systems and on assisting farmers to incorporate these developments into decision support systems.

Numerous short courses are held at Muresk, including in-service training schools for personnel of the Department of Agriculture and for field and service staff of agricultural firms.

The number of students enrolled at the College in 1986 was 293.

COMMONWEALTH GOVERNMENT ASSISTANCE FOR EDUCATION

The State Government has the major responsibility for education, including the administration and substantial funding of primary, secondary and technical and further education. The Commonwealth Government provides supplementary finance to the States and is responsible for the total funding of universities and colleges of advanced education. The Commonwealth also has special responsibility for Aboriginal people and for migrants, as well as the power to provide assistance for students.

There are two national education commissions which advise the Commonwealth Government on the needs of educational institutions throughout Australia for the purposes of financial assistance: the Commonwealth Schools Commission and the Commonwealth Tertiary Education Commission.

TABLE 10.15 - COMMONWEALTH GOVERNMENT ASSISTANCE FOR EDUCATION WESTERN AUSTRALIA (\$'000)

<i>Nature of assistance</i>	<i>1984-85</i>	<i>1985-86</i>
Assistance of a revenue nature—		
Universities	85,199	93,936
Colleges of advanced education (a)	85,273	95,118
Technical and further education	12,804	13,475
Schools	98,497	110,292
Participation and equity program	8,140	6,260
Aboriginal education	2,945	3,048
Pre-school education	4,860	2,430
Total	297,718	324,559
Assistance of a capital nature—		
Universities	5,440	6,662
Colleges of advanced education (a)	3,618	5,353
Technical and further education	15,725	16,138
Schools	22,061	22,156
Aboriginal education	19	-
Pre-school education	-	-
Video facilities	99	149
Total	46,962	50,458
Total	344,680	375,017

(a) Including teachers colleges.

Details of Commonwealth Government financial assistance for education in Western Australia are shown in Table 10.15.

EXPENDITURE ON EDUCATION BY STATE AND LOCAL AUTHORITIES

Details of expenditure on education by State and local government authorities are shown in Table 10.16.

TABLE 10.16 - STATE AND LOCAL GOVERNMENT AUTHORITIES (a): OUTLAY ON EDUCATION (b) (\$'000)

<i>Particulars</i>	<i>1984-85</i>	<i>1985-86</i>
Pre-school education—		
Current	23,638	25,535
Capital	116	54
Primary and secondary education—		
Current	582,036	623,555
Capital	33,524	65,679
Tertiary education—		
Technical and further education—		
Current	89,008	106,885
Capital	24,487	35,492
University education—		
Current	80,721	90,321
Capital	12,496	10,480
Other higher education—		
Current	82,451	80,046
Capital	7,315	12,486
Education n.e.c. (c)—		
Current	33,271	37,040
Capital	1,022	1,290
Transportation of students—		
Current	23,584	26,961
Total	993,669	1,115,824
Current	914,710	990,343
Capital	78,959	125,481

(a) State authorities comprise State Government departments and instrumentalities. Local authorities refer to municipal governments set up under local government legislation. (b) Includes expenditure from Commonwealth Government Grants for education. (c) Includes special education and education not definable by level.

Financial assistance for schools and students

The State Government provides financial aid to non-government schools by means of a direct annual grant in respect of each student enrolled. The grant incorporates a needs component and separate rates are applicable to primary and secondary schools.

Assistance is also given to private schools by way of reimbursement of interest paid, up to a prescribed maximum rate, on moneys borrowed for expenditure on new residential accommodation, classrooms and associated facilities and school site acquisition. The scheme also applies to the provision of teacher accommodation north of the 26th Parallel.

A boarding-away-from-home allowance, free of means test, to supplement the isolated children's allowance paid by the Common-

wealth Government is also provided. The allowance of up to \$250 per annum ensures a combined minimum payment of \$1,239 per annum for a child who is obliged to live away from home to attend school.

The State Government Additional Assistance Scheme is also available to indigent parents who have children in years 8 to 12. This scheme aims to assist parents to meet the costs of education.

Chapter 11

CULTURE, SCIENCE AND RECREATION Culture

Tangible evidence of Western Australia's cultural development is apparent in the provision of major facilities for the arts. The State's central cultural complex, the Perth Cultural Centre, houses the Art Gallery of Western Australia, the State Library Collection, the Perth Institute of Contemporary Art and the Western Australian Museum. By the end of the decade, it is planned to have the precinct landscaped, performance spaces constructed, the Western Australian Museum facilities refurbished, and the Centre fully established. The new Forrest Place development links the Cultural Centre with the city.

DEPARTMENT FOR THE ARTS

The Department for the Arts was established in 1986 under the *Public Service Act 1978*. Its broad objectives are to:

- improve opportunities for arts practitioners and arts organisations to achieve their professional objectives;

- enhance opportunities for communities to enjoy, participate in and otherwise be involved in the arts;

- increase the recognition of the importance of the arts in community development;

- ensure optimum use of resources provided through the arts portfolio.

The Department's portfolio embraces the statutory authorities of the Western Australian Museum, the Art Gallery of Western Australia, the State Library Service, the Perth Theatre Trust, the Western Australian Film Council and the State Censorship Office.

The Department provides support for a number of arts agencies, and organisations which perform roles as producers of arts or as resource bodies for the arts. These include agencies in the fields of theatre, music, the visual arts and crafts, puppetry, dance, ethnic arts, community arts, aboriginal arts, film and television, literature, arts facilities and the preservation of material culture.

The State Government provides Creative Development Fund grants to assist individual artists in the creation of original works and the exploration of new forms. Triennial funding of the major subsidised arts

organisations provides stability and capacity for effective forward planning. These programs, like most grants for arts projects and organisations, are administered by the Department for the Arts.

Western Australia has nine major subsidised performing arts organisations: the Western Australian Ballet Company; the Western Australian Arts Orchestra; the Western Australian Youth Orchestra; The Western Australian Opera Company; Deck Chair Theatre Company; the Hole in the Wall Theatre; Spare Parts Puppet Theatre; Swy Theatre Company and the Western Australian Theatre Company. These organisations performed to audiences totalling some 206,700 patrons in 1986. In 1986 the annual Festival of Perth accounted for ticket sales of over 150,000, earned a box office income of \$1.1 million, and featured 25 international attractions during a three and a half week period.

Regional arts facilities include art galleries at Geraldton and Bunbury and performing arts facilities at Karratha, Geraldton and Esperance. Demand from non-metropolitan regions for professional arts tuition and services is met by the Department for the Arts Regional Cultural Development Program. This offers support for a range of activities including short-term artist-in-residence schemes, touring activities, community arts projects and Arts Access workshops.

The Crafts Council Centre in Perth provides the State's craftspeople with a number of studios for short term residencies and an exhibition gallery devoted exclusively to their use. Visual arts, crafts and literature are further served by the Fremantle Arts

Centre, which maintains an annual program of exhibitions, residencies and workshops. The Centre also houses the Fremantle Arts Centre Press, funded to publish Western Australian writing in areas such as short fiction, poetry and social history. The Praxis Group, also based in Fremantle, is funded under the State's Contemporary Art Space program, and plays both a supportive and an educative role in this area. The Film and Television Institute provides training, screenings and production facilities for the Western Australian public and filmmakers.

PUBLIC LIBRARIES

The Library Board of Western Australia

The Library Board of Western Australia is constituted to advise the Minister and local authorities on matters of general policy relating to libraries and to administer the funds made available by Parliament for the State library and information service.

The State library service comprises: The State Reference Library of Western Australia which includes the Central Music Library; the J.S. Battye Library of West Australian History including the State Archives; the State Bibliographical Centre; the State Film Centre; and local public libraries throughout the State. These units are co-ordinated by the Board to provide an integrated and comprehensive library and information service throughout the State.

TABLE 11.1 - THE LIBRARY BOARD OF WESTERN AUSTRALIA

Particulars	Unit	1985-86
Expenditure	\$	18,307,518
Staff (a) (b)	No.	258
Associated public libraries		217
Books—		
Total circulation stock (a)		1,836,838
Received and dispatched in the exchange program with local libraries		869,446
Inter-library requests received		116,619
Visitors to reference libraries		530,048

(a) At 30 June. (b) Number of full-time staff plus full-time equivalent units of part-time staff.

The State Archives. Under legislation passed in 1974 the Board has responsibility for the control and custody of all State archives. These include the records not only of the Government but also of all local authorities and all other bodies established under statute. When records cease to be in current use they become the responsibility of the

Board and their destruction is prohibited without the approval of the Board.

The State Bibliographical Centre. The Function of the State Bibliographical Centre is to encourage and facilitate co-operation between all libraries in Western Australia, so that the total resources in the State may be made available to all library users.

The Centre operates the Request and Information Service provided by the Board for all public libraries, organises inter library loans for, or between, any other approved libraries in the State or elsewhere, and offers bibliographical assistance to any library and to users of the State Reference Library.

The State Film Centre. The State Film Centre provides a free film and video lending service to groups and organisations throughout Western Australia.

Some 8,000 films and videos, selected in response to user demand, cover hundreds of different subjects and a catalogue of these is available in every public library in the State.

Local public libraries. The books in all public libraries in the State are supplied by the Board and remain its property. Any non-fiction book in the State-wide stock is available at any public library if requested by a reader.

As far as possible, selection of books for each library is carried out by the local librarian but the Board's staff makes the selection for those libraries which are unable to do so.

The Board is not responsible for the provision of local premises nor the employment of local staff, which are provided by the local authority concerned. However, professional advice on library design is available to architects and local authorities.

All 139 local authorities in Western Australia have established one or more public libraries.

THE WESTERN AUSTRALIAN MUSEUM

The Western Australian Museum has its headquarters and principal display galleries in Perth, with branches in Fremantle (Fremantle Museum and Western Australian Maritime Museum), Albany (Albany Residency Museum) and Geraldton (Geraldton

Museum). The Museum has responsibilities for Aboriginal material, including sites, and for historic shipwrecks. The Director also has delegated powers in respect of wrecks and material under Commonwealth control.

Table 11.2 includes details for all branches of the Museum.

TABLE 11.2 - THE WESTERN AUSTRALIAN MUSEUM

<i>Particulars</i>	<i>Unit</i>	<i>1985-86</i>
Expenditure	\$	6,484,188
Staff (a)	No.	187
Days spent on field work		3,628
Public attendance-		
Western Australian Museum,		
Perth		274,434
Fremantle Museum		97,242
Western Australian		
Maritime Museum		54,848
Albany Residency Museum		60,376
Geraldton Museum		26,149

(a) At 30 June.

The work of the Museum is concerned mainly with natural sciences and human studies. Emphasis in both displays and research is on the fauna and the human population, past and present, of Western Australia.

The Trustees of the Museum are empowered to assist in establishing and maintaining local museums. The Museum's role is mainly to assist by making available the expertise of its own staff in advising on the maintenance of collections, restoration of objects, and on museum design, and by depositing objects for display in recognised museums. At present eighteen local museums are recognised under the provisions of the Museum Act.

The Museum is an active educational instrument. Members of the scientific staff lecture in the various departments of tertiary educational organisations. Educational Centres, staffed by teachers provided by the Education Department, conduct classes at the Museum in Perth and the Fremantle Branch throughout the year. Regular classes for primary schools are held during school term and special visits are arranged for secondary schools at both Perth and Fremantle. In addition special visits at both museums, as well as at Albany and Geraldton, are made by children from schools not included in the regular series. During school holidays quizzes are available at the Education Centres at Perth, Fremantle, Albany and Geraldton.

The Museum is often called upon to act in an advisory capacity to Government departments. Senior staff serve on Government committees for protection of the heritage, the environment and wildlife. The Museum is assisted in certain fields by Honorary Associates, some of whom serve on advisory committees appointed by the Trustees.

THE ART GALLERY OF WESTERN AUSTRALIA

The Art Gallery of Western Australia incorporates seven major galleries, an auditorium, conservation laboratories, a prints and drawings study room, a restaurant and a bookshop. The Gallery Administration Centre, incorporates a library, a theatre and the Art Gallery Society rooms. As well as exhibiting works from the permanent collection, activities of the Gallery involve the presentation of important exhibitions from overseas, and lectures and exhibitions by visiting artists.

TABLE 11.3 - THE ART GALLERY OF WESTERN AUSTRALIA

<i>Particulars</i>	<i>Unit</i>	<i>1985-86</i>
Expenditure	\$	3,735,915
Staff (a)	No.	71
Exhibits for display (a)		8,800
Exhibitions for year		37
Visitor attendances		211,585

(a) At 30 June.

THE ART GALLERY SOCIETY OF WESTERN AUSTRALIA

The Art Gallery Society supports the Gallery through functions organised both within the Gallery and at other venues. Donations from fund raising efforts make possible the acquisition of many important art works which otherwise may not have been obtained.

THE ABORIGINAL ARTS BOARD

The Aboriginal Arts Board is constituted under the *Australia Council Act 1975*. It supports activities involving the preservation and continuation of traditional cultural practices and their associated art forms as well as the generation of new artistic expression

among Aboriginal people in urban and country areas.

Aboriginal Arts Board grants for arts programs in Western Australia increased in 1985-86 with forty-three grants awarded to-

talling \$493,130. This compares with thirty-three grants amounting to \$342,665 awarded for Western Australian Aboriginal arts projects in 1984-85.

Science

STATE GOVERNMENT OBSERVATORY

The primary instruments at the Observatory are the 61 cm Lowell Cassegrain reflector, a 33 cm Astrographic refractor and the 19 cm Meridian Transit Circle. Other telescopes are used as required and include the 41 cm University reflector, built by the Physics Department of the University of Western Australia, a 35 cm Celestron Cassegrain reflector and two 20 cm portable Meade Cassegrain reflectors.

The Lowell telescope is equipped with a photoelectric photometer to measure the brightness of celestial objects and a plate camera for direct photographs. It is used principally for photometry of solar system objects.

The Astrographic telescope was used for investigating photographically the motion of stars over long periods of time; observations of minor planets; observation of comets (including recovery of periodic comets) enabling orbits to be computed and for securing photographs of the southern skies. Since August 1987, when the Observatory's activities were reduced, the first of these functions has not been performed.

The Meridian Transit Circle is a fundamental telescope for measuring star positions. It has only one axis, aligned east-west, so that the telescope can traverse only the Celestial Meridian. As the Earth rotates, the planets, stars, Sun and Moon appear to revolve from east to west across the sky. By observing the precise times that they cross the Meridian, the astronomer can measure their positions very accurately, ultimately building a fundamental reference frame of stars.

The Perth Observatory co-operates directly with other observatories in the area of

astrometric research and provides astronomical information for Western Australia.

STATE GOVERNMENT CHEMICAL LABORATORIES

The Government Chemical Laboratories, a division of the Department of Mines, serve government instrumentalities and semi-government authorities and undertake some chemical work for the general public. Activities, which are organised under seven Branches, cover agriculture and engineering chemistry; food and industrial hygiene; forensic, material, mineral and water sciences; and metallurgy.

TABLE 11.4 - GOVERNMENT CHEMICAL LABORATORIES
SAMPLES SUBMITTED FOR EXAMINATION

Laboratory	1985-86
Agricultural Chemistry	51,386
Engineering Chemistry	186
Food and Industrial Hygiene	5,692
Forensic Science	9,669
Kalgoorlie Metallurgical	3,527
Materials Science	490
Mineral Science	4,160
Water Science	15,364
Total	90,474

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION

The Commonwealth Scientific and Industrial Research Organization (CSIRO), the largest scientific research organisation in Australia is a statutory body employing some 7,500 staff in more than 100 laboratories and field stations throughout Australia. Seven laboratories and field stations involving three hundred staff operate in Western Australia.

An Advisory Council and advisory committees in each State and the Northern Terri-

tory are established to facilitate the work of the Organization. The Western Australian committee, comprising representatives of State Government, tertiary institutions, agriculture, business and community interests, acts as an interface between the State and CSIRO through the Advisory Council. It also maintains an interest in the Organization's activities, particularly with respect to research programs within the State.

The work of the CSIRO is carried out within six Institutes: Information and Communication Technologies; Industrial Technologies; Minerals, Energy and Construction; Animal Production and Processing; Plant Production and Processing; and Natural Resources and Environment. Each Institute consists of several Divisions. Of these Divisions, two, Water Resources Research, and Minerals and Geochemistry, have their headquarters in Perth. Divisional groups from Forest Research, Entomology, Animal Production, and Plant Industry and Soils, are represented in the Laboratory for Rural Research (Perth), while several other Divisions use laboratories or field stations in Perth and in other parts of Western Australia.

DEPARTMENT OF AGRICULTURE

Reference to the scientific work of the Department of Agriculture appears in the Section *The Department of Agriculture* in Chapter 13.

BOTANIC GARDEN

The Botanic Garden in the Kings Park recreational area of Perth is under the control of the Kings Park Board (see following section *Public Parks and Reserves*). The Garden is the counterpart of The Western Australian Museum in the botanical field and complements the State Herbarium by maintaining collections of living plants for

scientific and educational purposes. Its official objectives are to foster public interest in the conservation and cultivation of the Western Australian flora; to contribute to public education in this field; to become a centre for botanical and horticultural research in the flora of Western Australia; and to provide a major tourist attraction. The education centre established in the Park caters for more than ten thousand school children each year.

The Garden extends over thirty-four hectares, made up of the Western Australian collection (seventeen hectares), Californian, South African and Mediterranean collections (three hectares), and an arboretum of native trees (fourteen hectares). The indigenous flora of the State is represented in the Western Australian collection by approximately 1,200 species. Trees grown as specimens in the arboretum are mainly those which are native to the southern half of the State. Display glasshouses extend the range of plants exhibited with species unsuited to cultivation in the open ground of the Botanic Garden. These include plants from the drier inland parts of the Pilbara and Kimberley regions of the State and salt-bushes and other succulents. Plants requiring humid conditions, such as carnivorous plants and ferns, are kept in separate collections. In the central courtyard is a collection of cycads and a pool with aquatics.

Parties from the Botanic Garden are regularly in the field for the collection of propagating material. Special attention is devoted to the preservation of rare species or species threatened with extinction. Seed of native plants collected is distributed from surplus stocks to botanical institutions throughout the world. Experimental work in propagation of native plants is carried out and a native plant display is held in the Park each spring.

Recreation

PUBLIC PARKS AND RESERVES

It is within the power of the Governor to dispose of, in any manner which serves the public interest, lands which are vested in the Crown and, in terms of this authority, Crown land is frequently reserved by order of the Governor for a variety of public purposes. Some of this land is reserved for public recreation and amusement, national and other public parks, or flora and fauna sanctuaries and the reserves are controlled by statutory bodies, the more important of which are dealt with in this section.

Department of Conservation and Land Management

The Department of Conservation and Land Management is required to manage these public lands and waters for the benefit of present and future generations of Western Australians. The essence of National Parks management is to encourage public enjoyment of the natural attributes of these lands, meeting the diverse needs of the community, but in a manner that does not compromise conservation objectives.

National Parks and Marine Parks are vested with the National Parks and Nature Conservation Authority, a statutory body responsible to the Minister for Conservation and Land Management. A majority of the Authority's members represent community interests.

The State's 4.4 million hectares of National Parks contain picturesque landscapes ideally suited to more passive nature-based activities such as sightseeing, photography, bushwalking, nature study and picnicking and camping in designated areas. This park system is complemented by some 2 million hectares of State forest, which offers opportunities for picnicking, camping, backpacking, canoeing, fishing, marroning, orienteering and other pursuits. Within certain specified areas, other activities including horse and trail bike riding are permitted, subject to certain management controls.

Kings Park

The Kings Park Board administers an area of almost 401 hectares close to the centre of

Perth. In addition to its original function as park and recreation ground, Kings Park has over the years gradually developed two other important functions, as a National Shrine and as a Botanical Reserve. In the former case it houses the State's most important monuments and commemorative features of a military and historical nature. 'Honour Avenues' of trees dedicated to individual fallen servicemen were planted in 1919 and later, and another avenue commemorates the State Centenary of 1929. There are smaller memorials erected by individual regiments or other military units, and a number of monuments to important historical personages.

The concept of the botanical reserve grew from the fact that four-fifths of the Park's area remained undeveloped under a natural bushland which contained many native wildflowers. Increasing urbanisation and the loss of natural sites in and close to Perth made the retention of this bushland area a matter of scientific and aesthetic value. This function was strengthened from 1962 onwards by the establishment in the Park of a botanic garden and arboretum of thirty-four hectares for the cultivation and display of Western Australian native plants.

Perth Zoological Gardens

The Zoological Gardens Board administers eighteen hectares of gardens and displays a wide range of animals in natural settings. The Board's four main objectives are conservation, education, research and recreation.

Perth Zoo exhibits the State's largest and most complete collection of Australian animals as well as a comprehensive collection of exotic animals. During the year ended 30 June 1986, 105 species of mammals, 231 species of birds and 45 species of reptiles were exhibited.

Sixty-eight full time staff operate the Zoo and special features are free school holiday activities and guided tours by trained volunteers.

Principal attractions of the Zoo are the koala exhibit, a house for nocturnal animals a well established breeding colony of orang-utans, attractive botanic gardens and water-

fowl lakes, a large collection of Australian native birds and a natural landscaped walk-through aviary. Other features are the landscaped great cats enclosure, the lesser primates exhibit, and the recently completed 'Wild Asia' project which includes a new elephant reserve and new exhibits for the otters and bears.

The Perth Zoo, which is open to the public every day of the year, ranks as one of the State's major tourist attractions and some 420,480 people visited it during the year ended 30 June 1986.

Rottnest Island

The Rottnest Island Board administers, as a tourist and holiday resort, a reserve of 1,930 hectares comprising almost the whole of Rottnest Island, which is situated about eighteen kilometres west of Fremantle.

During the year ended 30 June 1986, 216,359 persons visited the island by the daily commercial air and sea transport services.

Other reserves

Caves Reserve. Extensive limestone caves have been discovered at several places in the south-west part of the State. Some of them, between Cape Naturaliste and Cape Leeuwin and at Yanchep, have been developed for public inspection and certain areas of the surrounding land have been reserved, notably at Yanchep, Yallingup, Margaret River and Augusta.

Local government reserves. Many local authorities hold land for recreational purposes, the areas having been either Crown land vested in the Council, acquired by way of purchase, or received under private bequest. Included in these local government reserves are areas required to be surrendered to the Crown by private owners to provide recreation areas where land is divided into private residential lots. The reserves are frequently developed as public parks or to provide facilities for sports or camping.

THE DEPARTMENT FOR SPORT AND RECREATION

The Department for Sport and Recreation is responsible to the Minister for Sport and Recreation.

Throughout the State, the Department works closely with all levels of government, the private sector, and communities to influence the planning and provision of community leisure needs. To assist this work, the Department has specialist branches relating to sport, facility development, outdoor recreation and active recreation programs involving all population groups. A comprehensive regional network ensures provision of services in many country locations.

The Department makes recommendations to the Minister concerning Sports Instant Lottery funds and other government grants to local government authorities and community groups for capital works; special development projects; for training courses for coaches, leaders, officials and administrators; salary subsidies to sporting associations; travel subsidies for selected persons travelling to national championships; the purchase of items of equipment; hosting national and international championships and regional games; single and multi-sport camps; innovative projects; resource development and long-term sports development plans.

The Department conducts training courses, education programs and seminars for people working in a voluntary capacity in youth, sport and recreation. A number of services which relate specifically to sport are conducted by the Department. Of particular significance are the Coaching Accreditation Scheme which trains up to 600 sports coaches in Western Australia each year. The Department also works closely with a wide range of community based agencies and individuals serving the needs of the community. The Department places high priority on equality of access to recreational opportunities and has initiated a number of activity programs, seminars, courses and information services which aim at improving the recreational opportunities and choices of elderly people, people with disabilities and young people.

Chapter 12

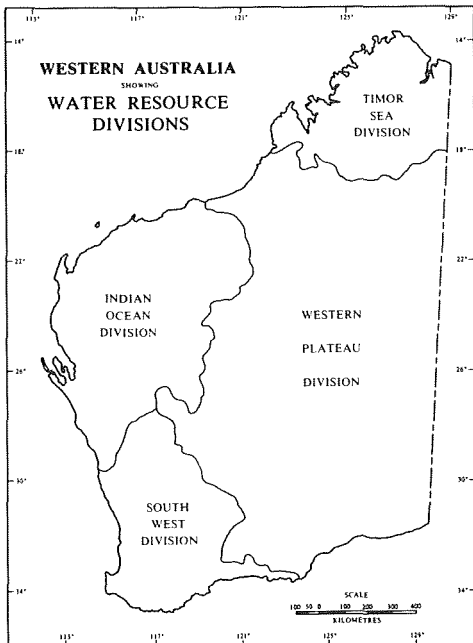
WATER

Water, being a scarce commodity in Western Australia, is a precious resource. Of the inhabited continents, Australia has the lowest average rainfall and the highest proportion of rainfall that is lost back to the atmosphere through evaporation and transpiration. Western Australia's average annual rainfall is 310mm compared with the Australian average of 420mm, and the average annual run-off from this western third of the continent is only eleven per cent of the nation's total.

WATER RESOURCES

The amount of usable surface and ground-water resources available in each of the drainage divisions of Western Australia is shown in Table 12.1. These divisions, which are based on surface water hydrological boundaries, are shown in Diagram 12.1.

DIAGRAM 12.1



Eighty-nine per cent of the State's fresh and marginal water resources (on a sustainable yield basis) are surface water and eleven per cent are groundwater. The majority of the resources, close to seventy-four per cent of the State's total, are in the Timor Sea Division. The next most abundantly endowed division is the South West, with just

under twenty-two per cent of the State's potable resources. The remaining 4.6 per cent of divertible potable resources are divided between the Indian Ocean Division (3.2 per cent) and the Western Plateau Division (1.4 per cent).

TABLE 12.1—DIVERTIBLE SURFACE AND GROUNDWATER RESOURCES
(million cubic metres per annum)

<i>Drainage division</i>	<i>Surface</i>	<i>Groundwater</i>	<i>Total</i>
South West	1,857	876	2,732
Indian Ocean	285	262	546
Timor Sea	8,660	523	9,183
Western Plateau	1	155	156
Total	10,800	1,815	12,620

WATER AUTHORITY OF WESTERN AUSTRALIA

The Water Authority of Western Australia controls the majority of water-related services in Western Australia.

It is responsible for the following water-related services: water supply in the Perth metropolitan area and the majority of country towns; water resources assessment and management throughout the State; Government irrigation schemes; sewerage schemes in the Perth metropolitan area and several country towns; major drains in the Perth metropolitan area and drainage in several country areas.

WATER SUPPLY

Western Australia has a great variation in the size and complexity of water supply schemes, which range from town schemes serving fewer than 100 people to the Perth

metropolitan scheme servicing a population of more than 1 million.

Considerable use is made of groundwater by individual farmers, pastoralists, market gardeners and others and it is estimated that over 92,000 bores are in use in the State. The quality of water is variable and much of it is too saline for irrigation or even for stock. Both artesian and non-artesian sources are used to supply or augment the supplies of numerous towns, including such major centres as Perth, Albany, Bunbury, Busselton, Carnarvon, Dampier, Esperance, Exmouth, Geraldton, Karratha and Port Hedland. In a number of ports and mining towns in the north-west mining companies are responsible for the provision of their own water supplies.

TABLE 12.2—DAMS AND RESERVOIRS—STORAGE CAPACITY (a)
(⁰000 kilolitres)

Dam or reservoir	Storage capacity
Big Brook Dam	700
Canning Reservoir	90,500
Churchman Brook Reservoir	2,200
Drakes Brook Dam	2,290
Fitzroy Dam	4,650
Glen Mervyn Dam	1,490
Harding Dam	63,800
Harvey Weir	9,126
Kununurra Diversion Dam (b)	97,400
Logue Brook Dam	24,300
Mundaring Weir	77,000
North Dandalup Pipehead Dam	(c)
Ord River Dam (Lake Argyle)	5,797,000
Samson Brook Dam	9,170
Serpentine Pipehead Reservoir	2,640
Serpentine Reservoir	194,500
17-Mile Dam (d)	5,489
South Dandalup Reservoir	208,000
Stirling Dam	56,123
Victoria Reservoir	860
Waroona Dam	14,954
Wellington Dam	184,900
Wungong Reservoir	60,000

(a) At 30 June 1986. (b) Ord River Diversion Dam. (c) Diversion weir only. (d) On Uralla Creek, an anabranch of the Fitzroy River.

Industries also use groundwater in substantial quantities, particularly in the processing of titanium, iron and alumina. Recent mineral discoveries in several areas have given rise to very large demands for water, the search for which has had to be intensified. Marked advances in the knowledge of aquifers and quality of water in the main sedimentary basin have been made as a result of extensive geological surveys and exploratory drilling by the Geological Survey

(a branch of the Department of Mines), several oil companies, and the Water Authority.

Perth Metropolitan water supply

The sources of the Metropolitan water supply are South Dandalup Reservoir, Serpentine Reservoir and Pipehead Reservoir, Canning Reservoir, Wungong Reservoir, Churchman Brook Reservoir, Victoria Reservoir, North Dandalup Pipehead Dam, groundwater from the shallow unconfined aquifers of the Swan Coastal Plain and artesian water from the deep confined aquifers. The supply from these sources is supplemented as necessary from a pipeline link with Mundaring Weir.

TABLE 12.3—METROPOLITAN WATER SUPPLY QUANTITIES OF WATER DRAWN(a)
(⁰000 kilolitres)

Source	1983-84	1984-85	1985-86
Canning Reservoir	37,414	36,722	16,092
Churchman Brook Reservoir	2,752	2,155	2,893
Mundaring Weir	7,909	6,085	1,031
North Dandalup Pipehead Dam	21,156	11,563	8,232
Serpentine Reservoir (b)	18,061	39,046	50,033
South Dandalup Reservoir	14,280	4,995	25,237
Victoria Reservoir	2,650	2,939	1,780
Wungong Reservoir	15,587	19,175	19,328
Metropolitan bores (c)	55,454	61,413	61,705
Total	167,354	184,053	186,331

(a) Including supplies to railways and shipping. (b) Includes water drawn from Serpentine Pipehead Reservoir. (c) Includes shallow underground water.

Water from storages in the Darling Range is conveyed to the metropolitan area by the Canning Tunnel, the Wungong Tunnel, and large trunk mains. It is then distributed by feeder, distribution and reticulation mains, either directly from the trunk main or from large storage service reservoirs at Mount Yokine, Mount Eliza, Bold Park, Mount Hawthorn, Richmond, Melville, Buckland Hill, Hamilton Hill, Thompson Lake, Greenmount, Mirrabooka, Wanneroo, Whitfords and Tamworth Hill and from summit tanks and water towers situated at high points throughout the area supplied. The Canning and Wungong Tunnels are designed to help meet the peak summer demand for water by producing high capacity links to Canning Dam and Wungong Reservoir respectively. In addition, groundwater is distributed, after

treatment, into the supply system. The groundwater is treated at water treatment plants situated at Gwelup, Mirrabooka, Wanneroo and Jandakot.

TABLE 12.4—METROPOLITAN WATER SUPPLY

Item	1983-84	1984-85	1985-86
Number of services	320,750	331,900	342,700
Length of water mains (kilometres)	8,367	8,558	8,766
Water consumed ('000 kilolitres)	165,000	182,000	180,000

Country water supplies

The Water Authority is responsible for all town water supply schemes in the country towns of Western Australia, with the exception of the Bunbury, Busselton and Harvey schemes which are run by local Water Boards. There are also a small number of town water supply schemes operated by mining companies. Individual water supplies serve railways, timber mill towns, isolated mines, pastoral properties, stock routes and agricultural areas, mainly from dams, tanks, wells and bores.

In country areas total control has been exercised on groundwater usage in Broome, Gascoyne, Swan and South-West Coastal Groundwater areas. The control of other areas has been tailored to specific problems which are known to exist.

Great Southern towns water supply. This scheme provides water to the coal mining town of Collie, together with towns and farmlands in the Great Southern Area. Water is drawn from Wellington Dam, and is supplied to towns from Brookton and Kondinin in the north to Kojonup and Gnowangerup in the south. It also supplies 600,000 hectares of farmland.

Details of the number of services, length of water mains and consumption for the years 1983-84 to 1985-86 are given in Table 12.5.

TABLE 12.5—GREAT SOUTHERN TOWNS WATER SUPPLY

Source	1983-84	1984-85	1985-86
Number of services	13,256	13,670	13,736
Length of water mains (kilometres)	2,338	2,339	2,370
Water consumed ('000 kilolitres)	5,129	5,720	5,513

Goldfields and Agricultural areas water supply. This scheme provides water to consumers in the Central Agricultural Areas and Eastern Goldfields. During 1985-86 water was supplied to 93 towns and to 2,650,000 hectares of farmland in the central and north-eastern wheatbelt. Water is pumped from Mundaring Weir on the Helena River, augmented by the Lower Helena Pipehead Dam and supplemented by the metropolitan system when necessary. The main pipeline between Mundaring and Kalgoorlie is 554 kilometres long, with eighteen pumping stations and extensions to country towns and agricultural areas at several points.

Details of the number of services, length of water mains and consumption for the years 1983-84 to 1985-86 are given in Table 12.6.

TABLE 12.6—GOLDFIELDS AND AGRICULTURAL AREAS WATER SUPPLY

Item	1983-84	1984-85	1985-86
Number of services	29,050	30,807	30,408
Length of water mains (kilometres)	7,038	7,061	7,956
Water consumed ('000 kilolitres)	21,913	21,538	19,484

(a) Figures include amounts consumed from local supplies at Waddouring-Barbalin-Knungajin, Bruce Rock, Narembeen and Kondinin.

Local and regional schemes

Lower Great Southern towns water supply. This scheme supplies the towns of Albany, Mount Barker and Kendenup. Water is drawn from three sources; Two Peoples Bay east of Albany (the water from which is treated for colour removal), Limeburners' Creek, and bores which are located on the west of Princess Royal Harbour.

Mandurah regional supply. This scheme provides water to the town of Mandurah, plus the localities of Yunderup, Furnissdale, Ravenswood, Riverside Gardens and Coodanup (located east of Mandurah), together with Erskine, Falcon, Avalon, Wannanup, Placid Waters, Florida, Melros and Dawesville (located south of Mandurah).

Approximately 90 per cent of the water consumed is supplied by gravity from the South Dandalup Dam with the remainder being injected into the supply main from bores at Ravenswood. At present the scheme supplies some 10,000 services and is

the most rapidly growing scheme in the State.

Geraldton regional water supply. The Geraldton regional water supply serves consumers in the towns of Geraldton, Dongara, Port Denison, Mullewa, Walkaway, Drummonds Cove, Eradu and Narngulu with water being drawn from the Wicherina, Allanooka and Wye Springs borefields.

Port Hedland regional water supply. The Port Hedland regional water supply provides water for the consumers of Port Hedland, Finucane Island and South Hedland from the complementary De Grey and Yule River borefields.

West Pilbara water supply. The West Pilbara water supply serves the towns of Dampier, Karratha, Wickham and Point Samson, and also the industrial complexes at Dampier, the Burrup Peninsula and Cape Lambert in the north of the State. Water is drawn from the Harding Dam in conjunction with the Millstream aquifer.

Supplies to other country towns. One hundred and forty-eight towns are supplied with water from stream flow, dams, tanks, wells and bores, the schemes being administered under the provisions of the *Country Areas Water Supply Act 1947*.

The Water Authority is also responsible for the provision and maintenance of tanks and wells as a source of cartage water for a number of small communities in gold mining and agricultural areas.

TABLE 12.7—LOCAL AND REGIONAL SCHEMES

Item	1983-84	1984-85	1985-86
Number of services	64,654	68,368	72,090
Length of water mains (kilometres)	3,575	4,130	4,227
Water consumed ('000 kilolitres)	44,287	43,937	45,620

Aboriginal communities. The Commonwealth Department of Aboriginal Affairs is currently funding the progressive upgrading of water supply and sewerage facilities at 40 Aboriginal communities. The investigation, design and upgrading of works is being undertaken by the Water Authority.

Water resources assessment and management

The Water Authority, in conjunction with the Western Australian Water Resources Council, is responsible for the assessment and management of water resources in Western Australia.

Supply and development. The Authority is responsible for the evaluation, measurement and general management of surface and groundwater resources, including research, investigation and hydrological studies.

Water quality. The Authority monitors and controls salinity and contamination of water supplies by an extensive sampling and treatment program. It also monitors land use management in catchment areas, particularly in relation to bauxite mining and forest management.

IRRIGATION SCHEMES

The Water Authority is responsible for the operation and maintenance of seven irrigation and fifteen drainage schemes throughout the State, from Albany in the south to Kununurra in the north.

South-West irrigation schemes

Irrigation schemes have been established by the State Government on the coastal plain south of Perth in the Waroona, Harvey, Collie River and Preston Valley Irrigation Districts between Waroona and Donnybrook. The water is channelled from dams in the adjacent Darling Range for irrigation of orchards, vegetables, and pasture and fodder crops for dairying and livestock raising.

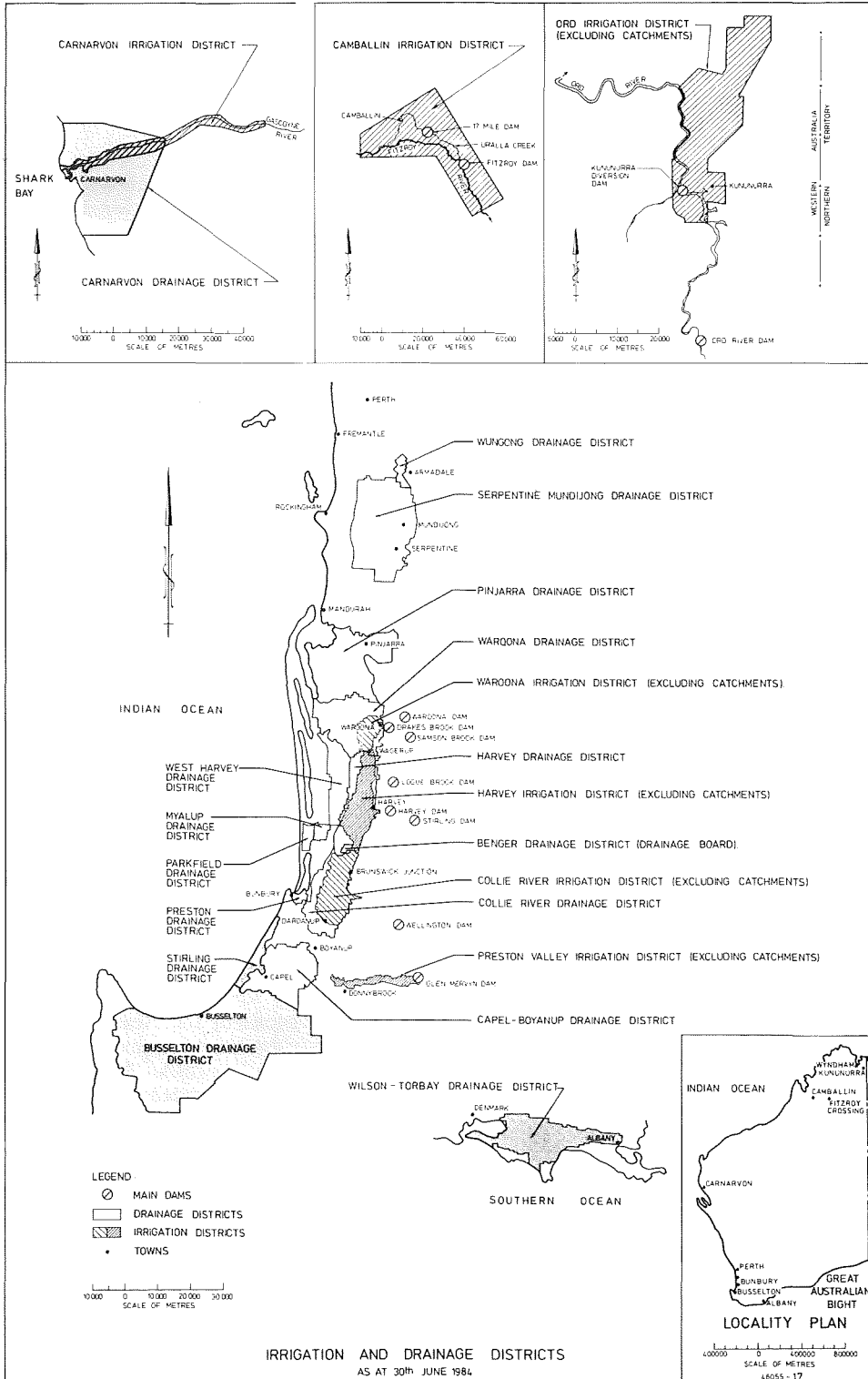
Specialist advice on irrigation farming methods is available through the Department of Agriculture and the properties are watered according to requirements and water availability.

Northern irrigation schemes

Carnarvon. Water is obtained from bores along the normally dry bed of the Gascoyne River. It is used in conjunction with water from private bores to irrigate banana plantations, vegetable crops and fruit trees.

Ord River. Water is drawn from the Kununurra Diversion Dam and the Ord River Dam (Lake Argyle) to irrigate a variety of crops, vegetables and tropical fruits.

DIAGRAM 12.2



Fitzroy River. The Fitzroy and 17-Mile Dams provide water for the Camballin irrigation area, although no large-scale development of irrigated crops has taken place as yet.

TABLE 12.8-IRRIGATION

Item	1983-84	1984-85	1985-86
Length of channels and drains (kilometres)	1,019	1,063	999
Assessments (number)	1,008	1,263	1,200
Area irrigated (hectares)	19,580	18,530	20,400
Water consumed (m kilolitres)	230	194	209

DRAINAGE

The Water Authority is responsible for the provision of a number of drainage and drainage-related services throughout Western Australia.

It is responsible for the preparation and implementation of an arterial drainage scheme for the Perth metropolitan area, whereby it receives surplus water from local drainage systems into controlled main drains and disposes of it through outlets to the sea or rivers, or by groundwater recharge where practicable. This scheme provides a means of co-ordinating the Water Authority's drainage 'planning activities with those of local authorities, particularly for potential areas of new land development.

The Water Authority operates and maintains thirteen proclaimed Drainage Districts, which are mainly located on the coastal plain south of Perth between Wungong/Serpentine and Busselton. Other declared Drainage Districts are between Denmark and Albany, and at Carnarvon. Many of these drainage districts are an inseparable adjunct to irrigation schemes on the coastal plain. A limited number of urban drainage schemes in country towns are also operated and maintained.

Advice on flood plain management and river improvement matters is provided by the Water Authority. This involves performing flood studies in order to identify and assess flood prone areas of the State. This service has received increased attention in recent years.

Diagram 12.2 illustrates irrigation and drainage districts in Western Australia.

SEWERAGE SCHEMES

The Water Authority aims to ensure the effective collection, conveyance, treatment and disposal of wastewater and industrial waste so as to safeguard community health and protect the environment.

Metropolitan sewerage

There are seven sewerage catchments within the metropolitan area administered by the Water Authority.

Wastewater from the major catchments either gravitates or is pumped through the pipe systems to treatment plants at Point Peron, Subiaco, Westfield, Woodman Point and Beenyup. After treatment the effluent is discharged into the Indian Ocean, some distance from the coast, under a substantial depth of water.

Two smaller catchments are served by treatment plants at Canning Vale and Kwinana where the treated effluent is disposed of in sandy soil in the vicinity of the plant sites.

TABLE 12.9-METROPOLITAN SEWERAGE SYSTEMS

Item	1983-84	1984-85	1985-86
Number of sewered assessments	251,217	261,770	278,900
Length of sewers (kilometres)	4,357	4,552	4,701

Country towns sewerage

At 30 June 1986 fifty-seven towns outside the metropolitan area had sewerage schemes which were constructed pursuant to the *Country Towns Sewerage Act 1948*. In addition, a further twenty-two schemes have been provided by local government authorities under provisions of the Health Act, and eleven as private development in mining areas by mining companies. Several other local government authorities have reached an advanced stage of planning to commence schemes in future years.

TABLE 12.10-COUNTRY SEWERAGE SYSTEMS

Item	1983-84	1984-85	1985-86
Number of towns sewered	56	56	57
Length of sewers (kilometres)	984	1,036	1,406
Number of services	46,860	47,820	54,170

REFERENCES

- Water Authority of Western Australia, *Annual Report 1986*.
- Western Australian Water Resources Council, *Water Resource Perspectives Western Australia; Report No. 2—Water Resources and Water Use*.

Chapter 13

AGRICULTURE, FORESTRY AND FISHING

Agriculture

INTEGRATED AGRICULTURAL STATISTICS

The principal source of statistics relating to the agricultural sector is the Integrated Agricultural Commodity Census, which is conducted annually by the ABS. Units (establishments) included in the census are defined and classified in accordance with the Australian Standard Industrial Classification (ASIC).

While no financial data are collected in the census, an 'estimated value of agricultural operations' (EVAO) is calculated for each establishment by applying unit values to

reported production and/or stock data. This procedure enables establishments in the census to be classified according to industry (ASIC) and also according to size of operations.

Since 1976-77, small establishments have been excluded from the census, to reduce ABS processing costs and minimise respondent burden. From 1976-77 to 1980-81 an EVAO cut-off of \$1,500 was used; in 1981-82 the cut-off was raised to \$2,500.

The effect of these cut-offs on statistics, other than counts of establishments, is minimal.

TABLE 13.1 - NUMBER OF ESTABLISHMENTS WITH AGRICULTURAL ACTIVITY—INDUSTRY AND ESTIMATED VALUE OF AGRICULTURAL OPERATIONS 1985-86

Industry of establishment		Estimated value of agricultural operations (\$'000)						
ASIC code	Description	Less than 20	20-49	50-99	100-199	200-499	500 and over	Total
0124	Poultry for meat	3	2	2	18	16	9	50
0125	Poultry for eggs	7	13	8	28	29	19	104
0134	Grapes	99	80	18	1	3	-	201
0135	Plantation fruit	6	17	34	61	8	-	126
0136	Orchard and other fruit	266	154	103	91	23	8	645
0143	Potatoes	7	26	48	58	35	2	176
0144	Vegetables (except potatoes)	151	155	96	71	42	13	528
0181	Cereal grain (incl. oil seeds)	76	86	185	423	719	160	1,649
0182	Sheep — cereal grains	83	275	1,063	2,257	1,716	193	5,587
0183	Meat cattle — cereal grains	7	8	6	9	3	1	34
0184	Sheep — meat cattle	156	232	217	121	57	12	795
0185	Sheep	571	538	707	620	293	29	2,758
0186	Meat cattle	993	466	183	96	80	15	1,833
0187	Milk cattle	29	72	236	238	38	1	614
0188	Pigs	40	42	39	42	31	9	203
0191	Sugar cane	-	-	-	-	-	-	-
0192	Peanuts	-	1	-	1	1	-	3
0193	Tobacco	-	-	-	-	-	-	-
0194	Cotton	-	-	-	-	-	-	-
0195	Nurseries	67	71	37	25	15	13	228
0196	Agriculture n.e.c.	256	118	58	25	13	-	470
01	Total agriculture	2,817	2,356	3,040	4,185	3,122	484	16,004
-	Other industries	114	77	33	16	10	4	254
-	Total all industries	2,931	2,433	3,073	4,201	3,132	488	16,258

TABLE 13.2 - NUMBER OF ESTABLISHMENTS WITH AGRICULTURAL ACTIVITY
INDUSTRY AND AREA OF ESTABLISHMENT: 1985-86

Industry of establishment		Area of establishment (hectares)						Total
ASIC code	Description	0-49	50-499	500-2,499	2,500-9,999	10,000-99,999	100,000 and over	
0124	Poultry for meat	48	2	-	-	-	-	50
0125	Poultry for eggs	89	15	-	-	-	-	104
0134	Grapes	171	29	1	-	-	-	201
0135	Plantation fruit	123	2	1	-	-	-	126
0136	Orchard and other fruit	483	158	4	-	-	-	645
0143	Potatoes	36	128	12	-	-	-	176
0144	Vegetables (except potatoes)	437	85	6	-	-	-	528
0181	Cereal grains (incl. oilseeds n.e.c.)	11	105	916	598	19	-	1,649
0182	Sheep — cereal grains	11	329	3,916	1,302	28	1	5,587
0183	Meat cattle — cereal grains	-	12	18	2	-	2	34
0184	Sheep — meat cattle	43	440	246	29	6	31	795
0185	Sheep	158	1,050	1,215	102	63	170	2,758
0186	Meat cattle	279	1,207	172	15	17	143	1,833
0187	Milk cattle	21	538	55	-	-	-	614
0188	Pigs	59	95	47	2	-	-	203
0191	Sugar cane	-	-	-	-	-	-	-
0192	Peanuts	-	2	1	-	-	-	3
0193	Tobacco	-	-	-	-	-	-	-
0194	Cotton	-	-	-	-	-	-	-
0195	Nurseries	202	19	6	1	-	-	228
0196	Agriculture n.e.c.	284	165	15	2	1	3	470
01	Total agriculture	2,455	4,381	6,631	2,053	134	350	16,004
-	Other industries	95	117	30	3	1	8	254
-	Total all industries	2,550	4,498	6,661	2,056	135	358	16,258

Statistics on the financial performance of the agricultural sector are obtained from the Agricultural Finance Survey, which has been conducted periodically by the ABS. This survey, which provides estimates of turnover, expenditure, cash operating surplus, capital expenditure and indebtedness was last conducted in respect of 1980-81. The reader is referred to the bulletin *Agricultural Industries, Financial Statistics, Australia, 1980-81* (Catalogue No. 7507.0) for data compiled from the survey.

A further Agricultural Finance Survey is being conducted in respect of 1986-87.

VALUE OF AGRICULTURAL COMMODITIES PRODUCED

For agricultural production the *gross value* is based on the wholesale price realised in the market place. Where commodities are consumed at the place of production or where they become raw material for secondary industry within the State, these points of consumption are taken as the market places.

TABLE 13.3 - GROSS VALUES, MARKETING COSTS
AND LOCAL VALUES OF AGRICULTURAL
COMMODITIES
(\$ million)

Particulars	1983-84	1984-85	1985-86
Crops and pastures—			
Gross value of production	1,107.5	1,645.1	1,185.6
Marketing costs	147.1	258.4	175.9
Local value of production	960.4	1,386.7	1,009.7
Livestock slaughtering and other disposals—			
Gross value of production	347.3	374.7	372.0
Marketing costs	18.4	27.1	21.1
Local value of production	329.0	347.6	350.9
Livestock products—			
Gross value of production	486.0	582.4	656.6
Marketing costs	21.6	27.6	30.2
Local value of production	464.4	554.7	526.4
Total agriculture—			
Gross value of production	1,940.8	2,602.2	2,214.2
Marketing costs	187.1	313.2	227.1
Local value of production	1,753.7	2,289.0	1,987.0

The *local value* is the value at the place of production and is obtained by deducting marketing costs from the gross value. Marketing costs comprise freight, cost of containers, commission, and other charges incurred in marketing. Gross values provide a reliable measure of the value of production of any particular commodity or group but when comparing or combining values for agricultural industries with those for secon-

dary industries the value added series of financial statistics from the Agricultural Finance Survey should be used.

Wheat was the most important item in 1985-86 with a gross value of \$736.3 million, followed by wool (including fellmongered and exported on skins) with \$577.3 million.

TABLE 13.4 - SUMMARY OF AUSTRALIAN STATISTICS: 1985-86

Particulars	Unit	NSW	Vic	Qld	SA	WA	Tas	Australia (a)
Agricultural establishments—								
Number		52,875	44,936	35,046	19,773	16,636	5,315	174,961
Area	'000 ha	63,330	14,184	158,092	60,662	113,833	2,087	485,168
Area of crops	'000 ha	5,990	2,528	3,231	3,039	5,970	88	20,853
Sown pasture	'000 ha	5,863	5,754	4,341	3,497	7,077	916	27,507
Gross value of—								
Crops	\$ m	2,166	1,281	1,671	916	1,186	148	7,378
Livestock slaughtering and disposals	\$ m	1,072	928	1,057	252	367	95	3,883
Livestock products	\$ m	1,289	1,198	408	430	657	147	4,131

(a) Includes Northern Territory and Australian Capital Territory.

LAND USE ON AGRICULTURAL ESTABLISHMENTS

In 1985-86 there were 16,636 agricultural establishments in the State, comprising 114 million hectares of land or about 45 per cent of the total area of Western Australia.

Of the total area of agricultural establishments, 6.0 million hectares were used for crops and 7.1 million hectares were under sown pasture in 1985-86. The balance consisted mainly of uncleared land (most of which is pastoral leases held by sheep and cattle stations), but it also included cleared land which was used for grazing or which was resting during the season, fallowed areas and newly cleared land.

TABLE 13.5 - LAND USE

<i>Particulars</i>		<i>1983-84</i>	<i>1984-85</i>	<i>1985-86</i>
Agricultural establishments	No.	17,200	16,890	16,636
Land use during the season—				
Used for crops	'000 ha	6,526	6,722	5,970
Under sown pasture	“	7,448	6,998	7,071
Lucerne (all purposes)	“	6	7	7
Other	“	100,307	100,243	100,785
Total area of establishments	“	114,287	113,970	113,833

Table 13.6 gives details of rural land use according to statistical division for 1985-86. Maps showing the boundaries of the statistical divisions and their component local government areas are located inside the back cover.

TABLE 13.6 - LAND USE IN EACH STATISTICAL DIVISION 1985-86

Statistical division	Agricultural establishments (number)	Land use during the season ('000 hectares)				Total area of establishments ('000 hectares)
		Used for crops	Under sown pastures	Lucerne (all purposes)	Other	
Perth	1,890	8.1	48.6	0.3	50.5	107.5
South-West	3,372	40.3	559.0	2.4	285.8	887.5
Lower Great Southern	2,799	650.1	1,798.3	1.4	418.4	2,868.2
Upper Great Southern	2,124	1,078.7	1,507.7	0.3	813.1	3,399.8
Midlands	3,718	2,648.3	1,572.7	0.3	3,198.7	7,420.0
South-Eastern	864	398.3	921.3	1.7	16,622.4	17,943.7
Central	1,656	1,142.9	660.2	0.3	39,925.9	41,729.3
Pilbara	70	-	0.2	-	14,925.0	14,925.2
Kimberley	143	3.5	2.8	-	24,545.5	24,551.8
Total	16,636	5,970.2	7,070.8	6.6	100,785.5	113,833.1

AGRICULTURE

Wheat

TABLE 13.7 - WHEAT FOR GRAIN
AREA AND PRODUCTION

Particulars	Unit	1983-84	1984-85	1985-86
Area	'000 ha	4,746	4,652	4,148
Production—				
Total	'000 t	4,316	6,580	4,362
Per hectare	tonnes	0.91	1.41	1.05
Gross value	\$'000	702,330	1,134,766	736,334

Although wheat has been grown from the earliest years of settlement, cultivation was confined to limited areas as late as 1890 when an area of approximately 14,000 hectares was grown. In 1985-86 4.15 million hectares were sown. This was well below the 1982-83 figure of 4.87 million hectares, which was the largest area ever sown to wheat in the State.

A summary of the history of the wheat industry in Western Australia, which covers the development of new areas, the effects of such factors as the decline in the goldmining industry, government land settlement policies and the introduction of new marketing practices is contained on pages 365-7 of the *Western Australian Year Book*, No. 20—1982.

Size classification of farms with wheat. Of the 16,636 agricultural establishments in the State in 1985-86, wheat for grain was grown on 7,078 or 42.5 per cent of the total. The median wheat crop was just under 400 hectares.

TABLE 13.8 - ESTABLISHMENTS GROWING WHEAT
FOR GRAIN
CLASSIFIED ACCORDING TO AREA SOWN
SEASON 1985-86

Area of wheat for grain	Number of establishments	Total area sown to wheat for grain
Hectares		'000 hectares
1 - 9	115	0.6
10 - 49	479	13.4
50 - 99	476	35.3
100 - 249	1,508	255.8
250 - 499	1,615	586.7
500 - 999	1,617	1,136.2
1,000 - 1,499	691	819.4
1,500 and over	577	1,300.3
Total	7,078	4,147.7

Bulk handling of wheat. The rapid increase in the production and export of wheat

between 1910 and 1920 caused problems of transport and storage, and proposals for the bulk handling of the grain led to the formation of a company for this purpose in 1920. This original undertaking did not commence operations owing to technical difficulties and problematical savings in handling costs. Constant attempts were made during the 1920s to find cheaper methods of storage and transportation of wheat.

A series of experiments in the 1930s led to the development of an economical bulk handling system and the grower co-operative company, Co-operative Bulk Handling Limited was set up in 1933 to operate the system. A detailed account of the history of Co-operative Bulk Handling Limited's method of operation and the techniques developed for handling the State's grain production is given on pages 369-70 of the *Western Australian Year Book*, No. 20—1982.

Marketing of wheat. The Australian Wheat Board is the sole authority for the marketing of wheat within Australia and of wheat and flour for export. The Board is also authorised to issue permits to growers to enable them, subject to certain conditions, to deliver their wheat other than to the authorised receiver of the Board. The Board derives its authority from the *Wheat Marketing Act 1984* established under joint Commonwealth and State legislation and applies to the season which commenced on 1 October 1984, and each of the next five succeeding periods of 12 months.

The Act, details of which are given on page 290 of the *Western Australian Year Book*, No. 24—1986, provides the industry with support from the Government that is designed to help overcome any short-run downturn in producers' returns, modified by longer-run adjustments in market returns whether these adjustments be for a rising or a falling market. To date, it has not been necessary for the Government to meet any deficiency between the net pool return rate and the Guaranteed Minimum Price.

Domestic wheat sales. The arrangements for the pricing of wheat sold on the domestic market recognise the different segments of the market, namely, the use of wheat for milling into flour for human consumption and the use of wheat for stockfeed and for industrial purposes.

The 1984 Act has changed the method of setting the domestic price for human consumption wheat. The price is now determined each quarter by averaging the export prices for the forward and past quarters and then adding a margin for the additional costs of servicing the domestic market.

The domestic prices for industrial and stock-feed wheats are quoted by the Board in the light of its commercial judgement and having regard to orderly marketing considerations. Prices are quoted by the Board each day and buyers may enter into contracts to fix the price of wheat for delivery up to six months in advance.

Official standard samples are widely distributed to commercial interests and appropriate Government Departments and instrumentalities both locally and overseas, as being representative of the wheat of the particular season which is on offer to the world grain markets.

Exports of wheat

TABLE 13.9 - OVERSEAS EXPORTS
OF WHEAT AND FLOUR
(tonnes)

Particulars	1983-84	1984-85	1985-86
Wheat	3,637,624	4,527,011	5,342,918
Flour	3,118	3,125	1,733
Estimated total wheat equivalent	3,642,020	4,531,417	5,345,362

Most of the State's wheat is exported as grain. Flour exports, which had been as high as 160,000 tonnes in the mid 1950s, now account for a minimal proportion of the State's wheat crop.

Oats

Although oats have been grown in Western Australia since the early development of wheat farming, cultivation was somewhat limited until stimulated by the introduction of large-scale sheep raising in the agricultural areas, when their high nutritional worth as stock feed made them a very valuable crop. In addition to their importance as local stockfeed, significant quantities of oats are also exported. The area sown to oats for grain increased from 78,000 hectares in 1920 to a peak of 538,000 in 1960. More recently, area sown has been subject to considerable fluctuations.

TABLE 13.10 - OATS FOR GRAIN
AREA AND PRODUCTION

Particulars	Unit	1983-84	1984-85	1985-86
Area	'000 ha	448	351	288
Production—				
Total	'000 t	456	460	338
Per hectare	tonnes	1.02	1.31	1.18
Gross value	\$'000	48,371	41,119	38,314

Barley

Barley grows well over a wide range of climatic and soil conditions and generally yields better than other cereals. It is more successful on saline soils where other crops may not do well and as a first crop on newly-developed land. Both 'two-row' and 'six-row' barley are grown. Part of the crop is retained on farms for stockfeed, while the balance is sold locally and overseas for malting or stockfeed manufacture.

In terms of area sown, barley is the second most important crop in the State, after wheat. The 623,000 hectares sown in 1970-71 moved barley ahead of oats for the first time. Since that year, although barley plantings have fluctuated from a low of 387,000 hectares in 1974-75 to a high of 965,000 hectares in 1984-85, they have exceeded oat plantings each year.

The Grain Pool of W.A. is the sole marketing authority for barley in Western Australia and is responsible for the marketing of barley for both export and local consumption in accordance with the *Grain Marketing Act 1975*. The licensed receiver for the Grain Pool is Co-operative Bulk Handling Limited.

TABLE 13.11 - BARLEY FOR GRAIN
AREA AND PRODUCTION

Particulars	Unit	1983-84	1984-85	1985-86
Area	'000 ha	771	965	826
Production—				
Total	'000t	797	1,431	1,024
Per hectare	tonnes	1.03	1.48	1.24
Gross value	\$'000	112,299	193,720	124,449

Lupins

The large-scale growing of lupins has been undertaken in Western Australia since the early 1970s. Apart from the drought-affected 1985-86 season, area sown has increased significantly each year since 1980-81, when 55,000 hectares were planted.

TABLE 13.12 - LUPINS FOR GRAIN
AREA AND PRODUCTION

Particulars	Unit	1983-84	1984-85	1985-86
Area	'000 ha	319	517	493
Production—				
Total	'000t	314	503	411
Per hectare	tonnes	0.99	0.97	0.83
Gross value	\$'000	53,174	62,004	63,925

Before 1974-75, marketing of lupins was conducted through a voluntary pool operated by The Grain Pool of W.A. In November 1975, under the provisions of the *Grain Marketing Act 1975* the marketing of nominated varieties of lupins became the responsibility of The Grain Pool of W.A. Significant amounts of lupins are exported overseas.

Other grains and oilseeds.

There was considerable interest in the production of rapeseed in the early 1970s, and plantings reached 42,000 hectares in 1972-73. Subsequent problems with disease saw plantings reach a low of 200 hectares in 1982-83; however, since then area sown has expanded to 3,600 hectares in 1985-86.

Triticale, a wheat/rye cross, was first recorded in the Agricultural Census in 1978-79, and since then plantings increased each year to 1984-85 when 39,000 hectares were sown. Area planted dropped back to 28,000 hectares in the drought affected 1985-86 season.

Grain sorghum, linseed, rye, field peas, vetches, safflower and sunflower are also grown but only in small quantities.

Hay

Large quantities of pasture hay are cut from clover and grass pastures, production in 1985-86 being 313,000 tonnes from 97,000 hectares. The principal cereal hay crop is oats and 235,000 tonnes of oaten hay were cut in 1985-86 from 69,000 hectares. Wheat is the only other cereal crop which is used extensively for this purpose and in 1985-86 the production was 67,000 tonnes from 27,000 hectares. Barley, vetches, rye and lupins are also used for hay making but they are of minor importance.

TABLE 13.13 - HAY—AREA AND PRODUCTION

Particulars	Unit	1983-84	1984-85	1985-86
Pasture (a)				
Area	'000 ha	108	116	97
Production	'000 t	335	367	313
Crop (b)				
Area	'000 ha	130	110	104
Production	'000 t	341	380	320

(a) Includes lucerne. (b) Principally from oats and wheat.

Pastures

Of the 7 million hectares of improved pastures in the south-west region some 6 million are sown to the legume subterranean clover. Other species used include medic, rose clover, serradella, lucerne and a variety of grasses, principally *Wimmera* ryegrass. The use of perennial grasses such as perennial ryegrass, kikuyu, phalaris and cocksfoot is restricted to a small area having a long growing season along the south coast.

Dominant legume pastures are initially easily established following the clearing of the native vegetation. As most of the soils are infertile a range of fertilisers must be used. Phosphorus, as superphosphate, is usually applied annually while minor elements such as copper, zinc and sometimes molybdenum, have to be applied at least once. Over time, other elements may also need to be applied for good pasture growth to be maintained. Potassium in particular can become deficient on the sandy soils of high rainfall areas.

While pastures are green for only 4-9 months of the year sufficient feed is produced for sheep and cattle to be maintained on the paddocks all year. Supplementary feeding of breeding stock is sometimes required, particularly if the autumn break to the season comes late. At such times the dry paddock feed is almost exhausted and the regenerating pasture is growing slowly.

An active legume breeding and selection program, centred at Perth, has produced many cultivars. From the cultivars now available it is possible to select one or more that are suited to environments ranging in annual rainfall from 350-1200 mm and in soil type from acid to alkaline. Cultivars have been selected that are persistent, tolerant of a range of diseases and insect pests, and that are low in fertility-reducing oestrogenic compounds.

TABLE 13.14 - PASTURE SEED HARVESTED

Particulars	Unit	1983-84	1984-85	1985-86
Subterranean clover—				
Area harvested	'000 ha	19.4	17.7	8.8
Production	tonnes	3,075	3,606	1,683
Lupins—				
Area harvested	'000 ha	3.6	3.2	3.3
Production	tonnes	763	797	802
Barrel medic—				
Area harvested	'000 ha	0.6	2.2	2.7
Production	tonnes	70	402	492
Total pasture seed—				
Area harvested	'000 ha	25.6	25.7	16.5

Potatoes

The cultivation of potatoes, the State's principal vegetable crop, is confined largely to the higher-rainfall areas of the south-west. Winter crops are planted during June and early July on the frost-free hillsides and drained flats of the coastal areas between Waroona, Donnybrook and Marybrook and on market garden land in the Perth Statistical Division. Mid-season plantings are made during August to October on sprinkler-irrigated land in the Manjimup area. Late crops are planted between mid-November and the end of February in all districts growing early or mid-season crops, other than the Perth Statistical Division. In recent years, potatoes have accounted for over a quarter of the State's vegetable area.

Potato production in Western Australia is controlled, under the provisions of the *Marketing of Potatoes Act 1946*, by the Western Australian Potato Marketing Board, which is the sole marketing authority for potatoes produced in the State. The object of this provision is to ensure adequate supplies for local consumption and effective marketing of crops. While production is principally for the local market, occasional surpluses are marketed overseas or in other Australian States.

Onions

The production of onions is confined largely to the Spearwood area near Perth and to Manjimup and Pemberton in the south-west. Yields of up to 55 tonnes per hectare are obtained. Over the last decade the area of onions planted has been steadily increasing although the 1985-86 planting of 329 hectares was a decrease from the record of the previous year.

Onions are imported annually into Western Australia during the winter but a surplus is produced locally during summer months and is exported.

Tomatoes

The main centres of production of tomatoes are at Carnarvon and Geraldton and in the south-west districts including Perth. At Carnarvon and Geraldton, because of the warm winter climate, growers are able to produce 'out of season' crops and complement those grown in more southerly areas during the summer months.

Supplies to the Perth market from December to June are grown in and near the metropolitan area, principally in the City of Wanneroo and in the hills at Jarrahdale. Tomatoes are also grown in a number of districts in the South-West and Lower Great Southern Statistical Divisions.

Other vegetables

TABLE 13.15 - PRINCIPAL VEGETABLES
AREA, PRODUCTION AND GROSS VALUE

Item	Unit	1983-84	1984-85	1985-86
Carrots—				
Area	hectares	553	610	639
Production	tonnes	20,758	22,925	21,828
Gross value	\$'000	6,354	7,155	8,007
Cauliflowers—				
Area	hectares	685	767	789
Production	tonnes	14,357	26,296	17,409
Gross value	\$'000	7,856	9,244	8,763
Lettuce—				
Area	hectares	282	288	361
Production	tonnes	10,157	8,461	10,501
Gross value	\$'000	4,507	3,218	4,340
Onions—				
Area	hectares	349	441	329
Production	tonnes	15,043	17,144	13,778
Gross value	\$'000	4,232	4,524	2,935
Potatoes—				
Area	hectares	2,008	1,965	1,896
Production	tonnes	69,566	70,425	69,270
Gross value	\$'000	20,427	18,034	22,117
Tomatoes—				
Area	hectares	279	278	292
Production	tonnes	8,771	8,498	8,596
Gross value	\$'000	4,753	5,929	7,870
All vegetables—				
Area	hectares	6,609	6,958	6,688
Gross value	\$'000	61,183	63,907	72,915

In addition to the cultivation of potatoes, onions and tomatoes previously mentioned, many other vegetables are produced, the bulk of them in or near the metropolitan area where growers benefit not only from

proximity to the principal market but also from an underground water supply at relatively shallow depths. Significant quantities of green peas for processing are produced in the Shires of Manjimup and Plantagenet. The Manjimup Shire is also a significant producer of onions and of beans for processing, and small quantities of vegetables are produced in other country districts.

Fruit

Fruit production is largely confined to the temperate regions between Gingin to the north of Perth and Albany on the south coast. The cool, wet winters and warm, dry summers of this area permit the successful cultivation of a wide variety of fruits.

TABLE 13.16 - FRUIT—AREA AND GROSS VALUE OF PRODUCTION

Item	Unit	1983-84	1984-85	1985-86
Area—				
Orchard fruit	hectares	6,274	6,433	5,883
Plantation and berry fruit	"	452	444	504
Grapes	"	2,086	2,182	2,173
Total	"	8,812	9,058	8,560
Gross value of production—				
Orchard fruit	\$'000	29,756	36,217	31,624
Plantation and berry fruit	"	8,161	8,003	13,590
Grapes	"	4,374	5,574	7,014
Total	"	42,291	49,794	52,228

In the southern and south-western sections, apples, pears and stone fruits are grown extensively while in the districts around Perth the principal crops are apples, stone fruits, citrus fruits and grapes. Outside this main fruit-growing area, banana plantations have been established at Carnarvon in the north-west and at Kununurra in the north.

Apples and pears

Apples, which are the principal fruit crop, account for more than half of the total orchard area. Donnybrook, Manjimup and the hills area near Perth are the most important centres but other districts in the south-west still produce significant quantities. In 1985-86, the total number of apple trees in the State was 721,000. Granny Smiths accounted for over 70 per cent of the 46,678 tonnes produced. Pears are usually grown in conjunction with apples, and although apples are still considerably more important, pear tree numbers have increased

by 50 per cent in the last 10 years. Exports of both apples and pears are significant, mainly to South-East Asian countries.

TABLE 13.17 - ORCHARD FRUIT—TREES, PRODUCTION AND GROSS VALUE

Item	Unit	1983-84	1984-85	1985-86
Apples—				
Trees	'000	692	737	721
Production	tonnes	38,167	59,128	46,678
Gross value	\$'000	16,910	21,409	17,613
Pears—				
Trees	'000	108	114	126
Production	tonnes	6,247	7,592	6,403
Gross value	\$'000	2,882	3,513	3,466
Lemons and limes—				
Trees	'000	34	32	31
Production	tonnes	2,943	2,893	2,254
Gross value	\$'000	640	673	743
Mandarins—				
Trees	'000	51	49	46
Production	tonnes	1,781	1,421	1,055
Gross value	\$'000	1,000	987	720
Oranges—				
Trees	'000	203	200	190
Production	tonnes	7,782	7,970	6,773
Gross value	\$'000	2,634	2,567	1,833
Nectarines—				
Trees	'000	46	61	62
Production	tonnes	1,063	1,036	1,001
Gross value	\$'000	569	736	811
Peaches—				
Trees	'000	89	101	112
Production	tonnes	3,151	3,054	2,374
Gross value	\$'000	1,124	1,694	1,544
Plums and prunes—				
Trees	'000	99	108	111
Production	tonnes	4,229	3,982	3,393
Gross value	\$'000	2,793	3,541	3,774

Citrus fruit

The Shire of Chittering, north of Perth, is a major citrus fruit producer, while other important areas near Perth are in the Shires of Kalamunda and Swan and the City of Armadale, and in the south-west, in the Shires of Harvey and Capel. Although oranges are by far the most important crop, substantial quantities of lemons and mandarins, and lesser quantities of grapefruit are also produced. Production is largely for local consumption but there is some export trade especially in lemons.

Stone fruits

Stone fruits are grown mainly in the hills districts in the Darling Ranges near Perth, and in the Shires of Manjimup and Donnybrook-Balingup in the south-west of the State; however some stone fruits are

grown in many other districts of the south-west.

Vineyards

Historically, the 'Swan Valley' region in the Shire of Swan has dominated the State's viticulture industry. In the early 1970s this region accounted for some 70 per cent of the State's vineyard area. Since then, pressures of urban growth in the Swan Valley have reduced the area under vines there, and new vineyards have been developed elsewhere in the State, principally at Margaret River, Mount Barker/Frankland and Bindoon/Gingin. As a result, the Swan Valley now accounts for just over 40 per cent of the State's vineyard area.

TABLE 13.18 - GRAPES—AREA AND PRODUCTION

Item	Unit	1983-84	1984-85	1985-86
Area of vines—				
Bearing	ha	1,933	2,037	2,033
Not yet bearing	ha	153	145	140
Grapes for wine making and table use—				
Quantity	tonnes	9,535	10,372	9,400
Gross value	\$'000	3,240	4,502	5,791
Dried vine fruits—				
Quantity	tonnes	822	774	756
Gross value	\$'000	1,134	1,072	1,223
Wine production—				
Beverage	kilolitres	4,559	5,019	4,935
Distillation	kilolitres	200	65	90

The Margaret River and Mount Barker/Frankland grape production is almost entirely used for winemaking; in other areas table and drying grapes are also significant.

Other fruit

Production of bananas is mainly confined to a narrow strip of land along the Gascoyne River at Carnarvon, with small, but increasing areas at Kununurra on the Ord River. The Carnarvon plantations are dependent on water pumped from bores which tap a subterranean flow in the sands of the usually dry river bed. As a surface flow in the river channel results only from heavy rains, which do not occur every year, a problem is presented in the falling-off of water supplies and in the increase in the salt content of the underground water during long dry periods. These conditions and also periodic damage from cyclones cause fluctuations in the area and in production. The crop is transported by road to Perth and

sold locally in competition with bananas imported from other Australian States.

Strawberry production has increased significantly in recent years. Nearly 90 per cent of area planted is within the Perth Statistical Division.

TABLE 13.19 - BANANAS—AREA AND PRODUCTION

Item	Unit	1983-84	1984-85	1985-86
Area of plants—				
Bearing	ha	296	299	339
Not yet bearing	ha	102	80	73
Production—				
Total	tonnes	10,200	8,492	11,102
Gross value	\$'000	6,551	6,150	10,992

Nurseries

The main concentration of commercial nurseries is in the Perth Statistical Division in the areas of Wanneroo, Kalamunda and Kelmscott. Most nurseries produce ornamental shrubs and trees; some specialise in the production of bedding plants while others concentrate on cut-flower production. Fruit trees, mainly citrus, are produced by specialist nurseries in the Perth Statistical Division while pome and stone fruit trees are mostly produced in the South-West Statistical Division at Manjimup and Donnybrook. Cultivated turf production has assumed increasing significance in recent years.

TABLE 13.20 - NURSERIES (a)
AREA AND GROSS VALUE

Particulars	Unit	1983-84	1984-85	1985-86
Area	hectares	565	792	863
Gross value	\$'000	23,516	27,613	32,383

(a) Including cultivated turf.

Artificial fertiliser

Soils in Western Australia are acutely deficient in phosphate and regular applications of phosphatic fertiliser are required for crop and pasture growth. Newly cleared land in particular requires heavy applications of superphosphate for satisfactory yields. Nitrogen deficiencies are also common. Legume pastures and lupins have assisted greatly in increasing nitrogen supplies. Potassium deficiency is primarily a problem on sandy soils in high rainfall areas.

Many Western Australian soils and particularly sandy soils are also deficient in trace

elements. The use of fertilisers is therefore a significant factor in the State's farming activity.

TABLE 13.21 - ARTIFICIAL FERTILISER USED ON RURAL HOLDINGS

Particulars	Unit	1983-84	1984-85	1985-86
Crops—				
Area fertilised	'000 ha	n.a.	6,291	5,157
Quantity used—				
Superphosphate	'000 t	361	362	280
Other	'000 t	327	371	321
Total	'000 t	688	733	601
Pastures—				
Area fertilised	'000 ha	4,051	3,924	3,909
Quantity used—				
Superphosphate	'000 t	427	415	406
Other	'000 t	52	48	43
Total	'000 t	479	463	449

PASTORAL PRODUCTION

Throughout this section, where mention is made of the 'pastoral areas' the portion of the State referred to comprises the Kimberley and Pilbara Statistical Divisions and the Sub-divisions of Lefroy, Gascoyne and Carnegie. The balance of the State, referred to as the 'agricultural areas', comprises the Perth, South-West, Upper Great Southern, Lower Great Southern and Midlands Statistical Divisions and the Sub-divisions of Johnston and Greenough River.

In the early days of settlement, pastoral activities in Western Australia were confined largely to what are now the agricultural areas and were usually associated with the cultivation of crops. However, beginning with Captain George Grey's visit in 1838 to the area known as the West Kimberley, explorers increasingly drew attention to the pastoral possibilities of large sections of the present Kimberley, Pilbara and Central Statistical Divisions.

In 1857 and 1858, F.T. Gregory noted the existence of good pastoral country in the Murchison and the Gascoyne districts and in the course of a journey further to the north in 1861 he discovered the Ashburton, Fortescue, De Grey and Oakover Rivers. His reports of good grazing lands in the area led to the establishment of sheep stations by pastoralists from the south, the first of such ventures in 1863, being in the De Grey district of what is now the Pilbara Statistical

Division. Graziers were also turning their attention to the south-east and in the 1870s pastoral lands were being taken up in the coastal areas to the south of the Nullarbor Plain. Another development in the extension of pastoral activity began with Alexander Forrest's journey through the Kimberley in 1879 and his favourable reports on the suitability of the country for grazing. Leases along the Fitzroy and the Ord Rivers were stocked not only with livestock shipped from the south and from the other Australian Colonies but also with cattle brought overland to the area, principally from Queensland and New South Wales, by remarkable feats of droving.

Sheep

Table 13.22 shows the total number of sheep and their distribution between the agricultural and pastoral areas from 1960 to 1986. Additional details showing the number of sheep in the State appear in the Statistical Summary, Chapter 26.

TABLE 13.22 - SHEEP NUMBERS AND DISTRIBUTION

At 31 March	In agricultural areas		In pastoral areas		State total
	Number	Proportion of State total	Number	Proportion of State total	
	'000	per cent	'000	per cent	'000
1960	13,396	81.6	3,016	18.4	16,412
1970	29,844	88.7	3,790	11.3	33,634
1980	28,730	94.4	1,701	5.6	30,431
1984	27,494	93.1	2,024	6.9	29,518
1985	29,362	93.0	2,211	7.0	31,574
1986	30,690	92.4	2,522	7.6	33,213

The State's sheep numbers peaked at 34.8 million in 1976. Since the end of the Second World War, sheep numbers had shown an almost continuous increase until the mid 1970s. Since then numbers have fluctuated, reflecting variations in seasonal conditions and prices for wool and meat. The strong increases in sheep numbers in 1985 and 1986 have resulted from relatively strong wool prices and poor wheat prices.

In the agricultural areas, sheep farming is usually carried out in conjunction with grain growing, while in the pastoral areas sheep are generally grazed on large specialist 'sheep stations'. As a result, large flocks

predominate in the pastoral areas. In 1986, the average sheep flock in agricultural areas was 2,800, in pastoral areas 9,626. Merinos are the dominant breed. In 1986, purebred merinos comprised 94.2 per cent of the State's sheep flock, while merino comebacks accounted for a further 2.5 per cent.

TABLE 13.23- SHEEP FLOCKS AT 31 MARCH 1986
CLASSIFIED ACCORDING TO SIZE OF FLOCK

Size of flock (numbers)	Flocks	Sheep ('000)
1 - 99	539	22
100 - 999	2,158	1,079
1,000 - 1,999	2,511	3,734
2,000 - 4,999	4,240	13,440
5,000 - 9,999	1,400	9,314
10,000 - 19,999	327	4,235
20,000 and over	49	1,389
Total	11,224	33,213

Marketing of lamb

Lamb Marketing Board. All lamb produced for slaughter south of the twenty-sixth parallel in Western Australia is marketed through the Western Australian Lamb Marketing Board. The Board was established by the *Marketing of Lamb Act 1971* and began operations in December 1972. It came into being mainly as a result of pressure from, and following a referendum of, the State's lamb producers, who looked to the Board to improve the stability of their industry and increase returns.

The major aims of the Board are to administer an orderly method of marketing and encourage producer participation in lamb marketing, to operate an advance price schedule and a weight and grade system, and to rationalise procedures throughout the industry.

Apart from promoting lamb on the local market the Board is also responsible for lamb exports. During the period of the Board's operations there has been a marked change in the pattern of export sales of Western Australian lamb with reliance on the traditional United Kingdom market being replaced by other markets to the extent that the Board now exports to a wide diversity of overseas countries.

Wool

The increasing sheep numbers of the last two years, combined with improving average clips per head, resulted in near record wool production in 1985-86. The 38.5 million sheep and lambs shorn returned a clip of 171,500 tonnes of wool. A further 4,700 tonnes was accounted for by dead and fellmongered wool and wool exported on skins.

TABLE 13.24 - SHEEP SHORN AND WOOL
PRODUCTION

Particulars	Unit	1983-84	1984-85	1985-86
Sheep shorn	'000	26,756	28,319	29,701
Lambs shorn	"	7,476	8,655	8,824
Total	"	34,232	36,973	38,524
Average weight of wool shorn	kg	4.02	4.49	4.43
Wool production (in the grease)— Shorn	'000 t	137.5	165.9	170.8
Dead and fellmongered	"	0.9	0.6	0.8
Exported on skins	"	2.9	3.5	3.9
Total	"	141.4	170.0	175.5

During the war years wool was compulsorily acquired by the Commonwealth Government in accordance with an agreement with the United Kingdom. Government control ceased after the war and the auction system was reintroduced. Since then, there has been a range of legislative action taken with the aim of promoting the use of wool and wool products, encouraging efficient marketing and providing a steadying influence on market prices. A summary of this government action is contained on page 386 of the *Western Australian Year Book*, No. 20—1982.

A major development in the administration of the wool industry was the passing of the *Wool Industry Act 1972*, which brought into existence the Australian Wool Corporation on 1 January 1973. The functions of the Corporation relate to wool marketing, wool use promotion, wool research and the management of wool stores.

TABLE 13.25 - SHEEP AND LAMBS SHORN AND WOOL CLIP IN STATISTICAL DIVISIONS
YEAR ENDED 31 MARCH 1986

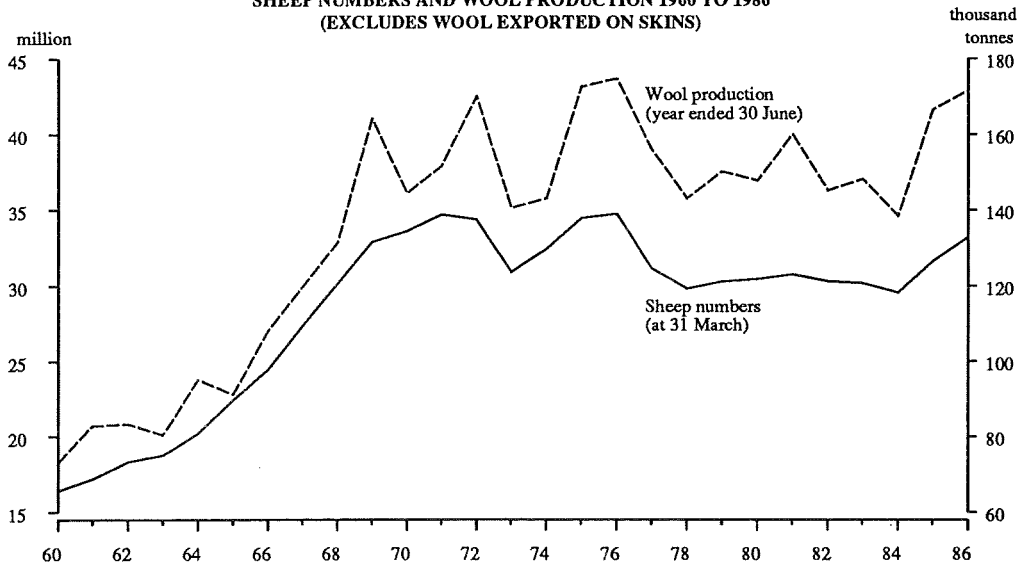
Statistical division	Sheep and lambs shorn			Woolclip			Average weight of wool shorn		
	Sheep	Lambs	Total	Sheep	Lambs	Total	Sheep	Lambs	Total
	'000	'000	'000	'000 kg	'000 kg	'000 kg	kg	kg	kg
Perth	91	14	105	410	20	430	4.52	1.43	4.10
South-West	1,675	428	2,103	8,361	707	9,067	4.99	1.65	4.31
Lower Great Southern	7,268	2,037	9,305	40,486	3,283	43,769	5.57	1.61	4.70
Upper Great Southern	6,225	1,961	8,185	33,532	2,944	36,476	5.39	1.50	4.46
Midlands	7,014	2,218	9,232	35,499	3,198	38,696	5.06	1.44	4.19
South-Eastern	2,781	852	3,633	15,225	1,489	16,714	5.47	1.75	4.60
Central	4,143	1,215	5,358	21,385	1,777	23,162	5.16	1.46	4.32
Pilbara	316	41	357	1,371	57	1,428	4.34	1.40	4.00
Kimberley	-	-	-	1	-	1	2.88	0.55	1.80
Total	29,513	8,766	38,279	156,269	13,474	169,743	5.29	1.54	4.43

Sale by sample and test certificate is now used for 99 per cent of the woolclip sold by auction or tender. This system has enabled sale by separation, where wool is stored in one centre and sold in another. Wool selling

centres with infrequent sales use this method to reduce delays in payment to growers.

Following amendments to the Wool Industry Act in 1977 the Corporation now has an active role in negotiating sea freights for wool to Australia's main markets.

DIAGRAM 13.1
SHEEP NUMBERS AND WOOL PRODUCTION 1960 TO 1986
(EXCLUDES WOOL EXPORTED ON SKINS)

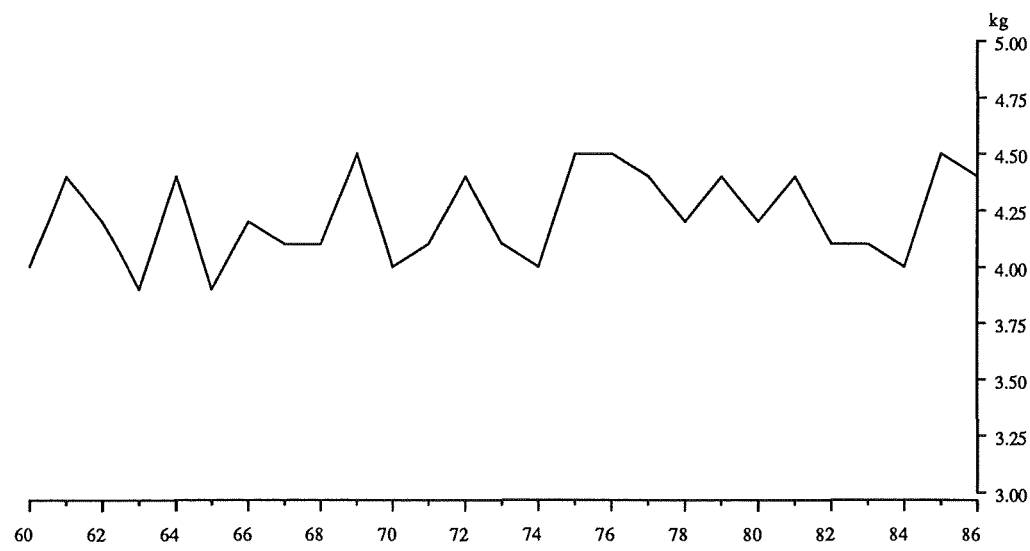


Although the greater proportion of the wool clip is exported in the grease, scouring or degreasing is done in the State and degreased wool is an appreciable item in the external wool trade. During 1985-86 exports of greasy and degreased wool were 136,091 tonnes and 20,168 tonnes, respectively. Further details of exports of greasy and degreased wool, both interstate and overseas, are given in Chapter 20—Foreign and Interstate Trade.

TABLE 13.26 - GROSS VALUE OF WOOL PRODUCTION (\$'000)

Item	1983-84	1984-85	1985-86
Shorn wool	402,645	498,187	569,564
Dead wool and fellmongered wool	1,606	985	1,456
Wool exported on skins	3,200	4,791	6,254
Total	407,451	503,963	577,273

DIAGRAM 13.2
AVERAGE WEIGHT OF WOOL PER SHEEP SHORN



Cattle

Cattle statistics are classified according to the two broad categories of 'meat production' and 'milk production', regardless of breed. At 31 March 1986, meat cattle comprised nearly 93 per cent of the State's cattle herd. More than half of the State's meat cattle are located in the pastoral areas of the State, where extensive grazing on very large cattle stations is carried out. In 1986, the average meat cattle herd size in the pastoral areas was 3,080 compared to 132 in the agricultural areas.

The cattle which were originally shipped or driven overland from the other Australian Colonies to start the industry in the northern pastoral areas were predominantly shorthorn breeds and these still form the great bulk of

all cattle kept for meat production in those areas. However, Brahman and Brahman infused breeds are increasing.

Slaughtering

Beef from cattle slaughtered at Broome in the Kimberley Division is principally for export. The local market for meat is supplied mainly from abattoirs at Fremantle, Waroona, Harvey, Bunbury, Albany, Woorooloo, Geraldton and Katanning. Most of these establishments also slaughter for the export trade. Small establishments operating in country towns also contribute to total production, and most stations and many farms slaughter sufficient for all or part of their own requirements. Some 65 per cent of all exports are destined for the United States of America.

TABLE 13.27 - CATTLE FOR MEAT PRODUCTION AT 31 MARCH
CLASSIFIED ACCORDING TO SIZE OF HERD AND LOCATION

Size of herd (number)	In agricultural areas		In pastoral areas		Whole State	
	Number of		Number of		Number of	
	Herds	Cattle	Herds	Cattle	Herds	Cattle
		'000		'000		'000
1986—						
1 - 29	1,610	19.7	17	0.1	1,627	19.8
30 - 99	1,868	110.5	20	1.1	1,888	111.6
100 - 299	1,517	259.0	36	7.0	1,553	265.9
300 - 499	301	114.2	25	9.6	326	123.8
500 - 999	174	114.2	31	22.4	205	136.6
1,000 - 1,999	45	57.0	33	46.2	78	103.2
2,000 - 4,999	14	39.5	50	154.0	64	193.5
5,000 - 9,999	1	6.0	34	229.2	35	235.2
10,000 and over	1	12.1	25	365.9	26	378.0
Total 1986	5,531	732.1	271	835.6	5,802	1,567.7
1985	5,709	714.1	270	836.4	5,979	1,550.5
1984	5,914	716.5	273	889.3	6,178	1,605.8

While the agricultural areas account for only 47 per cent of the State's cattle numbers, higher productivity and turnover than in the pastoral areas enables the agricultural areas to account for about 75 per cent of the State's beef production.

TABLE 13.28 - LIVESTOCK SLAUGHTERED AND MEAT PRODUCED

Particulars	Unit	1983-84	1984-85	1985-86
Livestock slaughtered (a)—				
Sheep	'000	2,485	2,293	2,802
Gross value	\$'000	32,889	38,356	36,126
Lambs	'000	1,040	1,152	1,085
Gross value (b)	\$'000	16,436	20,468	20,508
Cattle and calves	'000	517	513	462
Gross value (b)	\$'000	130,482	153,925	140,198
Meat produced (c)—				
Mutton and lamb	tonnes	59,499	61,273	67,676
Beef and veal	tonnes	97,637	101,383	90,771

(a) Mainly slaughterings for human consumption but also includes quantities condemned and small numbers of livestock slaughtered for boiling down. (b) Value on hoof at principal market. (c) Dressed carcass weight; excludes condemned carcasses and offal.

OTHER LIVESTOCK

Dairying

Compared with the wheat, wool and meat producing industries, dairying as a major well-organised rural activity is of fairly recent origin. Its growth was retarded initially by the difficulty of clearing heavily-timbered country in the south-west and the need for special methods of pasture establishment. As these problems were progres-

sively overcome dairying became a significant feature of primary production. After a period of intense rationalisation in the 1970s, the industry has been concentrated on the production of milk for the local liquid milk and fresh dairy products markets.

A summary of the history of the dairying industry in Western Australia, with specific reference to legislative and marketing arrangements, price instability and subsidy schemes, is contained on pages 391-2 of the *Western Australian Year Book*, No. 20—1982.

TABLE 13.29 - CATTLE FOR MILK PRODUCTION ('000)

Particulars	At 31 March		
	1984	1985	1986
Bulls	1	1	1
Bull calves (a)	-	-	-
Commercial dairy—			
Cows	69	69	69
Heifers	28	29	28
Heifer calves (a)	22	21	22
House cows and heifers	3	2	2
Total	124	123	122

(a) Under one year.

The bulk of the State's dairy cattle are concentrated in the high rainfall, near-coastal strip from Pinjarra to Augusta, with lesser numbers being found further east to Albany. Irrigation of pastures during the drier summer months plays an important role in the industry.

**TABLE 13.30 - CATTLE FOR MILK PRODUCTION
AT 31 MARCH 1986
CLASSIFIED ACCORDING TO SIZE OF HERD**

<i>Size of herd (numbers)</i>		<i>Number of herds</i>	<i>Total cattle ('000)</i>
1	- 9	1,063	2.6
10	- 49	103	2.5
50	- 99	66	4.9
100	- 149	131	16.6
150	- 199	133	23.1
200	- 249	111	24.6
250	and over	138	48.2
Total		1,745	122.4

TABLE 13.31 - WHOLE MILK PRODUCTION (a)

<i>Particulars</i>	<i>Unit</i>	<i>1983-84</i>	<i>1984-85</i>	<i>1985-86</i>
Quantity	million L	232	243	243
Gross value	\$'000	52,493	51,303	53,397

(a) Includes milk used for processing.

Pig raising

The principal pig raising districts are the grain growing areas of the Midlands and the Upper and Lower Great Southern Statistical Divisions. At 31 March 1986, 65 per cent of pigs were within these Divisions. Although the greater proportion of production is consumed locally, there is some export trade.

**TABLE 13.32 - PIG NUMBERS AT 31 MARCH
('000)**

<i>Item</i>	<i>1984</i>	<i>1985</i>	<i>1986</i>
Boars	3	3	3
Breeding sows	36	33	33
Gilts for breeding	5	5	5
Other pigs	257	233	236
Total	300	274	278

**TABLE 13.33 - PIGS SLAUGHTERED AND MEAT
PRODUCED**

<i>Particulars</i>	<i>Unit</i>	<i>1983-84</i>	<i>1984-85</i>	<i>1985-86</i>
Pigs slaughtered	'000	480	451	462
Gross value (a)	\$'000	36,128	42,747	46,723
Pigmeat produced (b)	tonnes	26,876	24,604	25,967
Bacon and ham produced (c)	tonnes	6,807	7,862	8,174

(a) Value 'on hoof' at principal market or at factory door.

(b) Dressed carcass weight; excludes condemned carcasses and offal but includes quantities used to produce ham. (c) Factory production.

Intensive piggeries have assumed greater importance in recent years, and there has been a reduction in the number of pigs

being raised in small or 'mixed farm' operations. While there has been little change in pig numbers over the last ten years, the number of herds at 31 March 1986 was less than half the number in 1976. Over the same period the proportion of pigs which were in herds of 500 or more has increased from 20 per cent to 60 per cent.

**TABLE 13.34 - PIG HERDS AT 31 MARCH 1986
CLASSIFIED ACCORDING TO SIZE OF HERD**

<i>Size of herd (numbers)</i>		<i>Number of herds</i>	<i>Total pigs ('000)</i>
1	- 9	169	0.8
10	- 49	414	10.9
50	- 99	236	16.5
100	- 199	181	26.2
200	- 499	180	57.0
500	- 999	86	59.1
1,000	and over	43	107.7
Total		1,309	278.2

Livestock in Australia

Table 13.35 gives details of livestock numbers in each State and Territory of Australia at 31 March 1986.

**TABLE 13.35 - LIVESTOCK NUMBERS AT 31 MARCH
1986—AUSTRALIA
('000)**

<i>State or Territory</i>	<i>Sheep</i>	<i>Cattle</i>		<i>Pigs</i>
		<i>Milk</i>	<i>Meat</i>	
New South Wales	58,001	438	4,972	798
Victoria	26,892	1,533	2,186	432
Queensland	14,311	359	9,303	585
South Australia	17,938	163	752	414
Western Australia	33,213	122	1,568	278
Tasmania	5,083	144	426	45
Northern Territory	1	-	1,458	3
Australian Capital Territory	122	-	12	-
AUSTRALIA	155,561	2,759	20,678	2,553

Poultry farming

Poultry farming in Western Australia is a specialised industry located almost entirely within the Perth Statistical Division. A few commercial egg farms are established in the more populous of the country areas.

Almost all the egg production and a large proportion of the chicken meat production is on holdings which specialise in the production of either poultry meat or eggs. A few laying birds are kept for commercial production on orchards, dairy farms and wheat farms throughout the agricultural areas.

The Western Australian Egg Marketing Board, constituted under the *Marketing of Eggs Act 1945*, is the statutory authority controlling the commercial production of eggs. Two other Acts, the *Poultry Industry Levy Act 1965* and the *Chicken Meat Industry Act 1977*, are used to regulate and control poultry farming.

Details of how these Acts control and regulate poultry farming is contained on page 311 of the *Western Australian Year Book*, No. 24—1986.

Details of poultry numbers in the State at 31 March of the years 1984 to 1986 are given in Table 13.36 while Table 13.37 shows eggs produced and poultry slaughtered for table purposes over the three years to 1986.

TABLE 13.36 - POULTRY NUMBERS AT 31 MARCH ('000)

Item	1984	1985	1986
Fowls	4,851	4,828	4,481
Ducks	3	3	3
Turkeys	6	12	17

TABLE 13.37 - EGG PRODUCTION AND POULTRY SLAUGHTERED FOR TABLE PURPOSES

		Year ended 30 June		
Item		1984	1985	1986
Egg production—				
Quantity (a)	'000 doz	16,470	16,326	15,858
Gross value	\$'000	23,963	23,997	23,469
Poultry slaughtered for table purposes—				
Dressed weight	tonnes	25,032	29,285	31,151
Gross value	\$'000	37,582	42,052	45,509

(a) Source: Western Australian Egg Marketing Board.

Beekeeping

Commercial producers of honey in Western Australia may be divided into three categories. There are a comparatively small number of specialist apiarists, engaged solely or mainly in honey production, who operate on a large scale and transport their hives from district to district. There are also some substantial producers who are engaged in agricultural activities and use their farms as a central site from which they may transport their hives to other areas as necessary. Finally there are the many farmers and orchardists who keep a few hives

and produce honey as a minor supplementary activity.

TABLE 13.38 - BEEKEEPERS, BEEHIVES AND HONEY PRODUCTION 1985-86

Item	Numbers of hives					
	40-99	100-199	200-299	300-499	500-799	800 and over
Beekeepers—Number	35	33	19	43	16	7
Productive beehives ('000)	1.2	2.5	3.7	14.1	7.5	6.4
Honey production (tonnes)	45	151	246	1,179	666	525

TABLE 13.39 - BEEKEEPERS AND PRODUCTION OF HONEY AND BEESWAX

Item	Unit	1983-84	1984-85	1985-86
Beehives—				
Productive	'000	37	37	35
Unproductive	'000	8	8	9
Honey production—				
Quantity	tonnes	2,845	3,452	2,812
Gross value	\$'000	1,824	2,180	2,251
Beeswax production—				
Quantity	tonnes	51	62	47
Gross value	\$'000	170	225	165

In 1985-86 exports of honey totalled 2,007 tonnes, the export value being \$2,354,057. The principal buyers were Malaysia, Singapore, the United Kingdom and the Federal Republic of Germany.

THE DEPARTMENT OF AGRICULTURE

A Bureau of Agriculture was formed in 1894 and became the Department of Agriculture in 1898. At that time cleared, arable land in Western Australia was less than one per cent of present farm land.

The Department of Agriculture, which has expanded progressively, has a broad role to foster the State's agriculture and to advise on marketing of its products. By representation on the Australian Agriculture Council, it helps establish nationally acceptable policies.

It is the branch of the State Government service which communicates scientific advice to farmers, pastoralists and allied industries, conducts a wide range of research and administers relevant Acts of Parliament. It

maintains services to assist farmers and its regulatory work consists of carrying out the provisions of some of the laws relating to agriculture.

The Head Office at South Perth houses the main administrative, research, specialist and diagnostic staff and there are twenty-four district offices and twenty-four research stations. Most research stations are for the wheat and sheep, beef, and dairying industries but specific stations cater for fruit, vegetables, poultry, pigs, viticulture and tropical agriculture.

The greater part of the Department's extension activities are carried out by the advisers and veterinary officers stationed at its twenty-four Regional and District Offices. Regional and District Offices are also responsible for thirteen country research stations.

A detailed description of the Department of Agriculture, including its history, structure and the services it provides to the agricultural sector is contained in pages 313-18 of the *Western Australian Year Book*, No. 24—1986.

AGRICULTURE PROTECTION BOARD

The Agriculture Protection Board is the body responsible for ensuring that the State's agriculture resources are protected from the sometimes devastating effects of plant and animal pests.

The Board administers the Agriculture and Related Resources Protection Act which replaced the Noxious Weed Act and the Vermin Act in 1976. Plants and animals can be declared by the Board to be 'declared plants' and 'declared animals' for the purposes of the Act.

The Agriculture Protection Board's role is to co-ordinate the control effort and see that declared plants and declared animals are dealt with according to its policies. In addition to co-ordinating overall agriculture protection policies, the Board advises on methods of control, maintains services to prevent pest animals and plants entering the State, and conducts research into the biology and control of vertebrate pests.

ADVISORY COMMITTEES

Responsibility for advising the Minister for Agriculture on various aspects of agricultural activity is vested in a number of advisory committees, whose members are drawn from government departments and authorities, industry organisations and marketing and storage organisations.

These committees include the State Wheat Advisory Committee, the State Coarse Grains and Seeds Advisory Committee, the State Soil Conservation Advisory Committee, Drought Consultative Committee and the Ord Project Co-ordinating Committee.

HERD IMPROVEMENT SERVICE OF WESTERN AUSTRALIA

The Herd Improvement Service of Western Australia (HIS) was established in November 1984 under the provisions of the *Herd Improvement Service Act 1984*. HIS is an independent corporate body based in Bunbury. It was created to amalgamate the services previously provided by the Artificial Breeding Board and the Department of Agriculture's Dairy Herd Recording Scheme. Accordingly, the purpose of HIS is to promote improvements of the quality and productive genetics of Western Australia's livestock through extensive use of advanced artificial breeding practices and scientific measurement of production as with the Dairy Herd Recording Service.

FARM MANAGEMENT SERVICE LABORATORY

The University of Western Australia, by resolution of the Senate, approved the establishment of the Farm Management Service Laboratory within the University in 1966. The aims of the Laboratory are to develop concepts and services in management accounting, computer planning and animal breeding which are specially suited to the needs of farmers; to make these developments available to farmers; and to use information processed by the Laboratory for teaching and research at the University of Western Australia.

Forestry

FORESTS FOR WOOD, WATER AND WILDLIFE

Most of Western Australia's native hardwood forests grow in the south-west of the State, between Walpole and Perth. From these forests are drawn a wide variety of essential resources, both tangible and intangible: the beauty and durability of their timbers is renowned world-wide, and generates a considerable income for Western Australia each year; the forests also provide an increasingly popular environment for recreation, within easy reach of major cities and towns. Catchment areas, which supply high quality water for domestic and agricultural use to the most populated areas of the State, occur throughout the forests; and conservation areas for native wildlife and plants ensure the long-term survival of many species, as well as providing an invaluable scientific and educational resource.

At present 1,897,346 hectares have been permanently dedicated as State forest, 119,175 hectares are held as Timber Reserves, and 26,558 hectares of freehold land is vested for pine production.

THE PRIME INDIGENOUS FORESTS

Jarrah (*Eucalyptus marginata*) is the State's principal timber and the prime forest covers almost 1.5 million hectares. Karri (*E. diversicolor*) is next in importance and is distributed over some 143,000 hectares. Wandoo (*E. wandoo*) accounts for a smaller portion of the dedicated area and Tuart (*E. gomphocephala*), another valuable timber, has a restricted area of about 3,000 hectares. Blackbutt (*E. patens*) occurs in patches throughout the jarrah and karri forests and is an important milling timber with properties and uses similar to jarrah. Marri (*E. calophylla*), the most widespread of the commercial eucalypts, is used to a limited extent as building scantling, pole timber and as the principal material for an export wood chip industry based on the Manjimup region.

Other eucalypts and many trees of different genera occur within the prime forest belt but they are not of major economic importance.

The main distribution of the prime forests, which are practically confined to the south-western portion of the State, is shown on Diagram 13.3.

THE INLAND FORESTS

East of the area of prime forest is an inland woodland, within which are a number of eucalypts (both tree and mallee form), as well as several types of Acacia, such as the wattles and mulgas, tea tree (*Melaleuca spp.*) and casuarinas. Sandalwood (*Santalum spicatum*), indigenous to the wheat belt and semi-arid areas of the State, is exported to Asian countries for use in the manufacture of incense.

The major emphasis of forestry activities in the goldfields area is the conservation of woodlands. During recent years, soil conservation in the regions of low rainfall has received increasing attention and the importance of controlling clearing, grazing and firewood cutting has been recognised. The Department of Conservation and Land Management maintains a staff to exercise these controls and to advise on tree planting. Work is proceeding with demarcation of areas representing important inland ecotypes for which long-term conservation proposals have been prepared.

FORESTRY ADMINISTRATION

Forests in Western Australia are managed by the Department of Conservation and Land Management, within a General Working Plan of multiple use management and regulation of an allowable hardwood sawlog cut. Major uses include wood production, water production, forest and catchment protection, recreation, flora, fauna and landscape conservation, scientific study and education, public utility and mining.

Timber harvesting in both natural forests and plantations is tightly controlled and closely monitored to meet environmental protection and disease management requirements, and to achieve the most efficient use of the resource.

To supplement native forest production, pine forests have been established throughout the South-West. There are over 60,000 hectares of State-owned plantations and an increasing amount of forests planted on private land. *Pinus radiata* and *Pinus pinaster* are the principal species.

Other major forest-related roles of the department include reduction of forest diseases, particularly jarrah dieback (*Phytophthora cinnamomi*), fire surveillance and control measures and the granting of sawmilling permits and forest produce licences.

FOREST PRODUCTION

Sawn timber from jarrah and karri is the principal form of forest wood production, but there will be a gradual increase in the use of pine in the future. Karri and locally grown pine logs together with imported logs are used for plywood. During recent years, there has been a greater use of local logs for plywood manufacture. Small sized logs from thinning pine plantations and manufacturing residues are used for the production of particleboard. Hardwood mill wastes and bush residues of marri and karri form the basis of an important export woodchip industry located in the southern forests.

In addition to these major wood products, the State's forest wealth includes sandalwood for export, firewood for general purposes, and various seeds and plants for propagation both in Australia and abroad. The karri, wandoo, marri and some inland scrub species are important nectar producers for apiarists, who move their bees to various forest sites to follow the nectar flow.

Table 13.40 gives details of log production and sawn timber production from 1983-84 to 1985-86.

TABLE 13.40 - TIMBER PRODUCTION
(cubic metres)

Particulars	1983-84	1984-85	1985-86
Sawlog production (a)—			
Hardwood	763,507	871,362	879,487
Softwood	52,744	70,173	89,082
Other log production (b)—			
Hardwood	502,612	588,582	579,350
Softwood	149,096	173,814	187,676
Sawn timber production—			
Hardwood	258,861	291,683	295,160
Softwood	14,723	21,632	33,816

(a) Includes sawlogs and logs used in the production of plywood veneer. (b) Includes chipwood.

Of the hardwood chiplogs supplied from State forest in 1985-86, 17 per cent were karri and 83 per cent were marri.

Sawmilling and timber production are also referred to under Manufacturing in Chapter 16.

Fisheries (including Pearling)

GENERAL FISHERIES

Rock lobsters are the most important item of production of the Western Australian fishing industry. The most important commercial species of rock lobster in Western Australian waters is the western rock lobster, which is fished off the south-west coast between Murchison River and Bunbury. The principal localities around which rock lobsters are caught are Houtman Abrolhos, Geraldton, Dongara, Green Head, Jurien Bay, Cervantes, Lancelin, Ledge Point and Fremantle. The industry is protected from overfishing by numerous measures and the catch is processed at shore stations licensed under the *Fisheries Act 1905* as processing establishments.

The catches of Australian salmon, which school in the bays on the south and lower south-western coasts, yield a significant proportion of the production of inshore and beach fishing and are used almost exclusively for canning. The remainder of the catch from this type of fishing comprises chiefly Australian herring, western sand whiting and sea mullet sold mainly as wet fish on the local market, and pilchard and scaly mackerel, sold as bait and for pet food. There is an important fishery for southern bluefin tuna on the south coast of the State and investigations are being conducted on the commercial potential of tuna stocks in northern waters.

TABLE 13.41 - FISH, CRUSTACEANS AND MOLLUSCS—CATCH AND VALUE

Species—Common name	Quantity (a) (tonnes)			Value (b) (\$'000)		
	1983-84	1984-85	1985-86	1983-84	1984-85	1985-86
Fish—						
Barramundi (Giant perch)	64	83	55	400.8	444.5	251.4
Cobbler	147	152	173	373.6	361.5	624.2
Emperor (North-west snapper)	137	243	247	183.7	413.2	575.3
Herring, Australian	1,085	1,269	838	553.3	685.4	477.5
Jewfish, Westralian	211	244	295	864.0	1,450.5	1,859.9
Mackerel, Spanish	260	260	319	442.4	627.6	899.0
Mullet, sea	610	591	438	439.0	479.0	433.6
Mullet, yellow-eye	545	444	386	348.6	297.7	270.3
Pilchard	2,801	4,213	5,334	1,120.4	1,685.3	1,973.4
Salmon, Australian	3,691	2,587	2,037	1,328.6	776.1	713.1
Scaly mackerel	311	1,415	1,287	161.6	622.5	605.0
Shark, bronze whaler	361	469	455	429.9	792.2	1,218.9
Shark, whiskery	282	285	298	347.4	407.0	689.4
Shark, other	620	817	804	516.3	821.8	1,075.1
Snapper	886	1,526	1,285	1,133.7	3,478.7	3,275.5
Tuna, southern bluefin	4,109	1,297	1,697	2,917.6	973.0	1,391.7
Whiting, western sand	217	243	225	336.3	478.6	565.4
Other species	1,475	1,526	1,830	1,772.4	2,474.9	3,602.8
Total fish	17,812	17,663	18,003	13,669.6	17,269.5	20,501.7
Crustaceans—						
Crabs	158	173	188	415.0	487.1	495.3
Prawns—						
Banana	61	279	91	381.3	2,035.4	877.1
Brown tiger	943	456	576	7,795.6	4,220.8	6,107.2
Endeavour	258	308	289	1,169.0	1,655.1	1,566.1
Western king	1,905	1,905	1,613	12,399.0	13,680.1	12,439.4
Other species	177	231	151	514.8	412.0	242.1
Total prawns	3,344	3,180	2,721	22,259.7	22,003.4	21,231.9
Rock lobsters	10,768	9,095	7,231	96,552.8	121,855.4	89,101.8
Total crustaceans	14,270	12,448	10,140	119,227.5	144,345.9	110,829.1
Molluscs—						
Abalone	296	327	247	1,821.9	1,978.9	3,293.6
Scallops	3,854	708	1,824	7,669.5	1,367.1	3,344.2
Other molluscs	285	397	551	269.9	481.2	721.3
Total molluscs	4,436	1,433	2,622	9,761.3	3,827.2	7,359.1
TOTAL, WESTERN AUSTRALIA	36,518	31,544	30,765	142,658.4	165,442.6	138,689.9

(a) Live (whole) weight. (b) Gross value paid to fishermen.

The coastal waters northward from the mouth of the Murchison River to North West Cape and Exmouth Gulf are the source of several species of commercial importance. Snapper are caught between the Murchison River and North West Cape during the northern schooling season from May to August. Cod and Spanish mackerel, though in smaller quantities, are also caught between the Murchison River and North West Cape.

Prawn fisheries have been established at Shark Bay and Exmouth Gulf, with the catch processed at Carnarvon and Learmonth respectively. The major species caught are western king prawns and brown tiger prawns, as well as quantities of banana

and endeavour prawns. In these areas and the smaller fisheries at Nickol Bay and Onslow the number of boats licensed to fish for prawns is restricted as a conservation measure.

Significant catches of scallops are taken in Shark Bay while a smaller fishery occurs at the Abrolhos Islands. In 1985-86 the scallop fisheries produced over \$3 million.

Shark fishing is an important activity on the lower west and south coasts. The other major species caught offshore in this region is the Westralian jewfish.

Abalone are taken by licensed divers in the southern half of the State with most production coming from the south coast. Species taken are greenlip, blacklip, brownlip and

Roe's abalone. The 1985-86 value of the fishery was over \$3 million.

The first fishing grounds to be exploited were the estuaries and rivers and, although they are not now as important as other grounds, they still provide substantial quantities of fish of a fairly wide variety. The principal species are cobbler and yellow-eye mullet, sea mullet and Perth herring most of which are caught in the Swan and Harvey Estuaries and the Peel and Leschenault Inlets. Other species taken include sand whiting, King George whiting, tailor, garfish and pilchard. Crabs, school prawns and western king prawns are also caught commercially in these waters.

FISHERIES ADMINISTRATION

The Western Australian Fisheries Department conducts research on a wide range of commercially important fish species such as rock lobsters, prawns, snapper, Australian salmon, pearl oysters and tuna. The Department is also involved in research on recreational fisheries, estuaries, freshwaters and environmental matters relating to fisheries. Much of this research is carried out in association with the Commonwealth Scientific and Industrial Research Organization, other State and Commonwealth bodies and tertiary education institutions.

Research is carried out chiefly at two centres. The marine research centre at Waterman, was built for the Fisheries Department and incorporates several separate laboratories and a large aquarium with circulating water, for experiments and studies on a wide range of species. A second centre, the Commonwealth Scientific and Industrial Research Organization marine research centre at Marmion was opened in 1976.

AQUACULTURE AND INLAND FISHING

Limited commercial production of marron began in 1977 following the passing of legislation which established fish farming guidelines, including licensing of marron farms. A number of other aquaculture ventures are proposed, including the commercial rearing of prawns, Atlantic salmon, brine shrimp and abalone.

Brown trout, rainbow trout and English perch have been introduced into the streams of the south-west, and rainbow trout are also reared commercially on a number of fish farms. These species together with indigenous stocks of freshwater cobbler, marron, barramundi and cherabin, provide sport for amateur inland fishermen.

PEARL-SHELL FISHING AND PEARL CULTURE

Pearl and pearl-shell fishing has been a valuable industry for many years, the main centre being Broome. The natural pearls obtained were once an important feature of production but the success of the industry now depends almost entirely on the shell produced and the price obtainable for it, and cultured pearl production from licensed farms.

AUSTRALIAN FISHING ZONE

The Australian Fishing Zone (A.F.Z.) covering waters within 200 nautical miles of Australia was declared on 1 November 1979. Under licence from the Commonwealth Government, foreign fishing vessels are permitted to fish within the Zone. A number of joint-venture feasibility studies and test fishing programs have been conducted in the Zone since its declaration.

Chapter 14

MINING

From a largely rural based economy Western Australia has emerged as a major force on the world mineral scene and is one of the world's leading producers of a number of key minerals.

MINING IN WESTERN AUSTRALIA

In 1885 gold was discovered in the Kimberley region of Western Australia. This find encouraged extensive prospecting which culminated in the rich discoveries of gold at Kalgoorlie and Coolgardie in the 1890s and by the end of the first decade of the 20th Century almost every known mineral had been found in Western Australia.

The emergence of the mining industry in Western Australia is marked by the mineral boom of the late 1960s which, while centred on iron ore in the Pilbara, encompassed many other mineral developments. These included: nickel at Kambalda; bauxite on the Darling Scarp; oil at Barrow Island; natural gas from the Dongara Fields; mineral sands at Capel and Eneabba; solar salt at Shark Bay, Port Hedland, Dampier, Lake MacLeod and Lake Lefroy; and talc at Mount Seabrook.

From a largely rural-based economy Western Australia emerged as one of the world's leading producers of a number of key minerals including iron ore, alumina, nickel, ilmenite, rutile and zircon.

Mining activity in most of the 1970s and early 1980s was subdued in comparison with the late 1960s and early 1970s. More recently the pace of activity has quickened considerably, mainly through increases in gold prices and consequently in gold mining activity, the development of the North West Shelf Gas project and the mining of diamonds at Argyle.

The locations of the major mining developments in Western Australia are detailed in Diagram 14.6

A more comprehensive picture of the history of mining and mineral exploration can be found in the *Western Australian Year Book*, No. 24 — 1986.

In Western Australia the development of minerals occurs under a variety of statutes, but notably the Mining Act administered by the Department of Mines. Co-ordination of major resource development projects is undertaken by the Department of Resources Development which was established by the State Government in 1980 in recognition of the special approach required to effectively support projects of the magnitude undertaken in this State.

The Western Australian Department of Mines

The primary role of the Department is to facilitate the orderly exploration and development of minerals and petroleum in Western Australia for the benefit of the community, now and in the future. It also provides scientific and technical advice to Government agencies and the public on geotechnical and mining related matters, provides chemical consultancy services, regulates and records the ownership of mining tenements and regulates for public safety in matters concerning explosives and dangerous goods.

The Department is responsible for the collection of royalties for minerals owned by the Crown. Royalties for the State Government in 1986-87 amounted to \$156 million.

The Western Australian Department of Resources Development

By presenting a single point of contact with Government, the Department of Resources Development facilitates development projects by co-ordinating the activities of government agencies in relation to a particular project and resolves issues between agencies and the developer or between agencies themselves.

MINING STATISTICS

Australian Standard Industrial Classification (ASIC)

Information presented in this and the following three chapters comes mainly from a system of integrated economic censuses based on the Australian Standard Industrial Classification (ASIC). ASIC classifies all economic activities into four hierarchic levels. At the broadest level of the classification, economic activities are grouped into 'industry divisions'. Each industry division is further divided into industry sub-divisions, groups and classes.

For a detailed explanation of ASIC refer to *Australian Standard Industrial Classification*, Volume 1 (1983 edition) (Catalogue No. 1201.0)

DIAGRAM 14.1
MINING ESTABLISHMENTS: VALUE ADDED
WESTERN AUSTRALIA IN RELATION TO AUSTRALIA

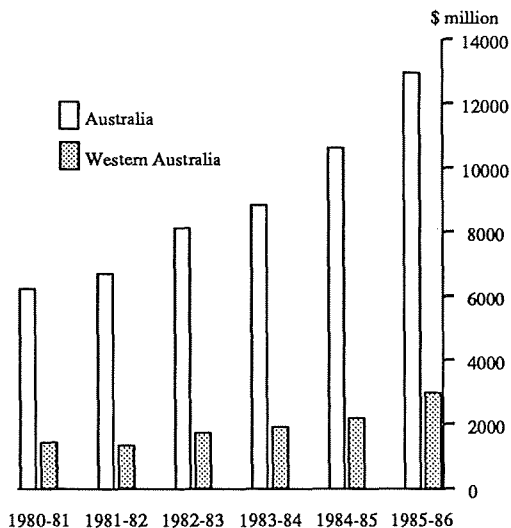


TABLE 14.1 - MINING ESTABLISHMENTS—SUMMARY OF OPERATIONS BY INDUSTRY SUBDIVISION

Industry sub-division	Number of establishments operating at 30 June	Persons employed (a)	Wages and salaries (b) (\$m)	Turnover (\$m)	Value added (\$m)
1985-86					
Metallic minerals	119	15,449	477.5	3,593.2	2,213.6
Coal, oil and gas	10	2,833	109.6	809.4	605.1
Construction materials (c)	40	371	8.9	66.1	33.6
Other non-metallic minerals	36	1,231	27.0	175.6	117.8
Total Mining, 1985-86	205	19,884	623.0	4,644.4	2,970.1
1984-85	218	18,900	530.4	3,625.2	2,184.2
1983-84	208	17,726	466.0	3,219.7	1,913.7

(a) Average over whole year. Includes working proprietors. (b) Excludes drawings of working proprietors. (c) Excludes sand and gravel.

Census of Mining Establishments

In 1985-86 mining establishments in Western Australia employed 19,884 persons, paid \$623 million in wages and salaries while value added was \$2,970 million.

Mineral production

Iron ore remains the most important mineral with 93 million tonnes, valued at \$1,795 million, being produced in 1985-86. This figure represents 43 per cent of the value of all minerals produced in Western Australia.

Gold production increased by 76 per cent from 1983-84 (26.2 tonnes) to 1985-86 when 46.1 tonnes were produced. The resurgence in the gold industry is the result of buoyant gold prices. Twenty-three significant new producers commenced production in 1986-87.

Detailed statistics on the mining industry are presented in Tables 14.1 to 14.3. Data contained in Tables 14.1 and 14.2 have been derived from annual Censuses of Mining Establishments.

TABLE 14.2 - MINING ESTABLISHMENTS—PERSONS EMPLOYED, TURNOVER AND VALUE ADDED BY INDUSTRY SUBDIVISION
WESTERN AUSTRALIA AND AUSTRALIA : 1985—86

Industry sub-division	Persons employed (a)			Turnover			Value added		
	Western Australia	Australia	Western Australia as a percentage of	Western Australia	Australia	Western Australia as a percentage of	Western Australia	Australia	Western Australia as a percentage of
			Australia			Australia			Australia
	'000	'000	%	\$m	\$m	%	\$m	\$m	%
Metallic minerals	15.4	30.8	50	3,593.2	6,002.2	60	2,213.6	3,632.0	61
Coal, oil and gas	2.8	39.3	7	809.4	12,295.7	7	605.1	8,605.9	7
Construction minerals	(b)0.4	6.1	6	(b)66.1	953.3	7	(b)33.6	506.8	7
Other non-metallic minerals	1.2	2.8	44	175.6	366.9	48	117.8	211.1	56
Total mining	19.9	79.0	25	4,644.4	19,618.1	24	2,970.1	12,955.8	23

(a) Average over whole year. Includes working proprietors. (b) Excludes sand and gravel.

TABLE 14.3 - MINERAL PRODUCTION

Mineral	Unit	1983-84		1984-85		1985-86	
		Quantity	Value (a)	Quantity	Value (a)	Quantity	Value (a)
			\$'000		\$'000		\$'000
Metallic minerals—							
Bauxite (b)	'000 tonnes	n.p.	n.p.	18,421	n.p.	19,413	n.p.
Copper concentrate	"	(c)42	n.p.	(c)45	n.p.	15	n.p.
Gold bullion	'000 grams	31,061	362,930	45,156	507,717	56,852	704,367
Iron ore	'000 tonnes	72,604	1,166,341	87,726	1,480,197	92,990	1,794,972
Mineral sands concentrates—							
Ilmenite	"	958	31,199	1,123	42,908	1,058	53,019
Leucosene	"	15	2,958	17	3,881	n.p.	n.p.
Monazite	"	16	6,483	14	5,980	16	9,227
Rutile (b) (c)	"	52	13,469	75	25,941	n.p.	n.p.
Xenotime	tonnes	(b)48	(b)246	(b)42	(b)398	n.p.	n.p.
Zircon	'000 tonnes	287	28,802	336	36,063	339	43,525
<i>Total mineral sands</i>	..	..	83,157	..	115,170	..	149,257
Nickel concentrate	"	(b)506	n.p.	(b)486	n.p.	(b)455	n.p.
Tantalite-columbite concentrate	tonnes	92	2,411	185	4,827	n.p.	n.p.
Tin concentrate	"	654	6,349	628	5,528	(b)679	n.p.
Zinc concentrate	'000 tonnes	(c)59	n.p.	(c)52	n.p.	14	n.p.
Total value metallic minerals	..	..	2,042,125	..	2,624,072	..	3,154,571
Coal, oil and gas—							
Coal (b)	'000 tonnes	3,942	106,325	3,673	109,120	3,765	126,841
Crude oil (including condensate)	megalitres	(b)(c)1,290	n.p.	(d)1,378	n.p.	(d)1,769	n.p.
L.P.G. (d)	"	2	n.p.	1	n.p.	1	n.p.
Natural gas (d)	gigalitres	1,012	n.p.	1,912	n.p.	2,928	n.p.
Total value coal, oil and gas	..	..	n.p.	..	n.p.	..	712,933
Construction materials—							
Building and monumental stone	'000 tonnes	51	n.p.	46	n.p.	94	1,394
Crushed and broken stone	"	3,221	29,286	3,991	36,244	4,680	47,796
Crushed and broken limestone	"	1,727	5,668	2,128	7,727	2,972	15,566
Total value construction materials	..	..	n.p.	..	n.p.	..	64,757
Other non-metallic minerals—							
Clays —							
Brick clay and shale	'000 tonnes }	1,205	6,108	1,633	8,752	{ n.p.	n.p.
Other (e)	"					92	2,564

TABLE 14.3 - MINERAL PRODUCTION—continued

Mineral	Unit	1983-84		1984-85		1985-86	
		Quantity	Value (a)	Quantity	Value (a)	Quantity	Value (a)
			\$'000		\$'000		\$'000
<i>Other non-metallic minerals—continued</i>							
Diamonds	'000 carats	(c)6,906	n.p.	(b)5,569	(b)45,057	(b)17,472	(b)147,568
Gypsum	'000 tonnes	616	4,901	596	5,663	370	3,634
Limestone		n.p.	n.p.	n.p.	n.p.	2,045	7,065
Salt		4,473	65,101	4,819	84,461	4,676	88,632
Silica		270	1,325	343	2,126	414	2,864
Spodumene	tonnes	(b)4,593	(b)885	(b)8,505	(b)1,853	n.p.	n.p.
Talc	'000 tonnes	(b)(c)159	n.p.	(b)(c)155	n.p.	(c)146	n.p.
Other (f)	..	..	97,723	..	n.p.	..	19,473
Total value other non-metallic minerals	..	..	176,043	..	162,684	..	271,801
TOTAL VALUE ALL MINERALS	..	..	2,579,490	..	3,295,934	..	4,204,122

(a) Ex-mine value. (b) Source: Department of Mines. (c) Source: Production from published producers' reports. (d) Source: Department of Primary Industries and Energy. (e) Includes attapulgite. (f) Includes feldspar, garnet concentrates, kyanite, magnesite, mica, peat, semi-precious stones, vermiculite and those minerals for which values are not available separately for publication.

DIAGRAM 14.2
MINING PRODUCTION
EX-MINE VALUE: 1985-86

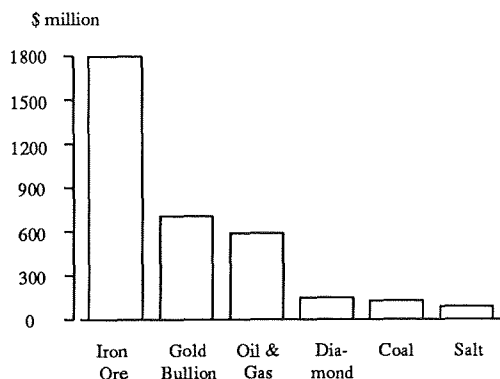
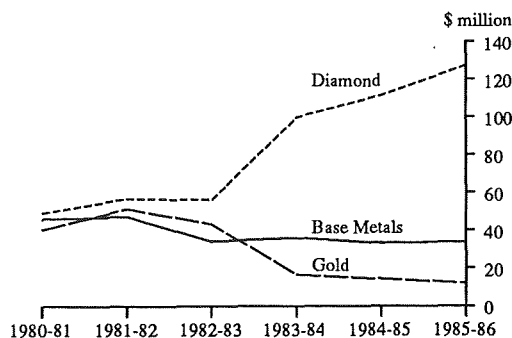


TABLE 14.4 - PRIVATE MINERAL EXPLORATION
(OTHER THAN FOR PETROLEUM)
EXPENDITURE BY TYPE OF MINERAL SOUGHT
(\$million)

Type of mineral sought	Total private exploration		
	1983-84	1984-85	1985-86
Coal	6.1	3.7	3.9
Construction materials	0.1	0.2	1.5
Copper, lead, zinc, silver			
nickel and cobalt	35.9	32.9	33.8
Diamonds	16.0	14.2	11.8
Gold	99.8	111.1	127.2
Iron ore	n.p.	15.5	10.9
Mineral sands	n.p.	0.8	2.4
Tin/tungsten	1.5	1.0	1.0
Uranium	9.8	5.3	6.5
Other	5.5	6.5	6.3
Total	184.7	191.0	205.2

DIAGRAM 14.3
PRIVATE MINERAL EXPLORATION
SELECTED MINERALS SOUGHT



PRIVATE MINERAL EXPLORATION (Other than for petroleum)

Detailed statistics on mineral exploration (other than for petroleum) are contained in Tables 14.4 to 14.6. Data contained in the tables have been derived from annual Censuses of Mineral Exploration (excluding Petroleum Exploration).

Mineral exploration (other than for petroleum) is carried out over a large portion of the State and is concerned chiefly with exploration for: bauxite; coal; copper; diamonds; gold; iron ore; lead; mineral sands; nickel; tin; uranium and zinc.

TABLE 14.5 - PRIVATE MINERAL EXPLORATION (OTHER THAN FOR PETROLEUM)
EXPENDITURE AND DRILLING

Particulars	1983-84	1984-85	1985-86		Total
			On production leases	On other areas	
Exploration expenditure (\$m)—					
Wages and salaries	39.2	39.0	6.2	31.1	37.3
Stores, materials and fuels purchased	21.2	19.0	3.6	16.2	19.8
Payment to contractors, consultants, etc.	62.9	68.4	18.0	59.4	77.4
Other current expenses	50.5	57.8	6.6	51.7	58.3
Net capital expenditure	10.9	6.8	4.2	8.3	12.4
Total	184.7	191.0	38.6	166.7	205.2
Drilling expenditure (a) (\$m)—					
On core drilling	22.6	25.6	9.9	17.7	27.5
On non-core drilling	21.6	23.8	6.1	26.2	32.3
Total	44.2	49.4	16.0	43.9	59.8
Drilling operations ('000 metres)—					
Core drilling	517	490	211	432	643
Non-core drilling	1,433	1,637	293	1,531	1,824
Total	1,950	2,128	504	1,963	2,467

(a) Included in 'Exploration expenditure' above.

TABLE 14.6 - PRIVATE MINERAL EXPLORATION
WESTERN AUSTRALIA IN RELATION TO AUSTRALIA
1985-86

Particulars	Unit	Western Australia	Australia	Western Australia as a percentage of Australia
Exploration expenditure	\$m	205.2	442.0	46
Drilling expenditure (a)	\$m	59.8	101.8	59
Drilling operations	'000 metres	2,467	3,537	70

(a) Included in 'Exploration expenditure'.

Expenditure on private mineral exploration peaked at \$86.1 million in 1970-71 at the culmination of extensive activity which followed the discovery of nickel at Kambalda in 1966. Thereafter, exploration activity declined, and, notwithstanding the rate of inflation throughout the 1970s, it was not until 1979-80 that the 1970-71 peak was exceeded. Strong growth in exploration for gold and diamonds was largely responsible for exploration expenditure reaching \$216.1 million in 1981-82. Expenditure in 1985-86 was \$205.2 million.

In 1980-81, expenditure on gold exploration was \$49.0 million, 26.2 per cent of total exploration expenditure (\$186.7 million). By 1985-86 this figure had risen to 62.0 per cent (\$127.2 million). Over the same period, metres drilled on non-core operation had also risen, reflecting the large-scale search for open pittable ore bodies.

PETROLEUM EXPLORATION

Exploration for petroleum began in the Canning Basin as early as 1922. However, it was not until the 1950s when drilling began in the Carnarvon Basin, that the exploration was encouraged. Commercial quantities of oil were eventually discovered at Barrow Island in 1964. Natural gas was discovered at Dongara in 1966 and, until the discovery and subsequent production of gas from the North West Shelf, formed the basis of supplies piped to Perth and its nearby industrial areas.

In 1972 large deposits of natural gas were discovered on the North West Shelf, offshore from Dampier. Development of the gas field, which also includes condensate—a light crude oil—constitutes the largest resource development project ever undertaken in Australia. Domestic gas production commenced in 1984 and construction of the liquefied natural gas (LNG) plant is proceed-

ing, with the first exports of LNG scheduled for October 1989. Exports will build up to a peak of 6 million tonnes a year during 1994-2008.

The high levels of activity associated with the development of the North West Shelf gas field and the discovery of oil and gas at a number of offshore and onshore locations peaked in 1982. In that year expenditure was \$463 million and 151,456 metres were drilled. Since then exploration activity has declined markedly principally owing to a world-wide decline in crude oil prices. Exploration expenditure in 1986 was \$144 million with only 37,137 metres drilled.

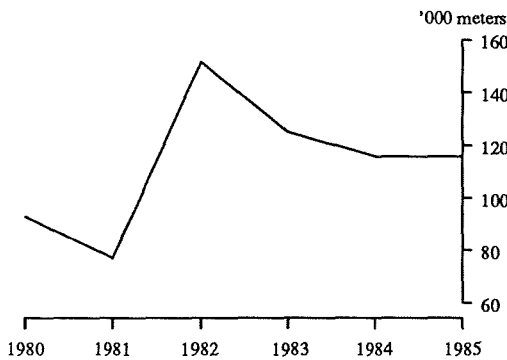
Information on petroleum exploration activity is provided in Tables 14.7 and 14.8. Data have been compiled from statistics published by the Bureau of Mineral Resources, Geology and Geophysics.

TABLE 14.7 - PRIVATE PETROLEUM EXPLORATION EXPENDITURE (\$million)

<i>Expenditure</i>	<i>1984(a)</i>	<i>1985</i>	<i>1986(a)</i>
Geological (onshore)	7.2	8.6	5.5
Geophysical	30.2	65.7	39.7
Drilling	271.6	189.7	95.3
Other	4.4	9.6	3.1
Total	313.3	273.6	143.6

(a) Includes South Australian offshore.

**DIAGRAM 14.4
PRIVATE PETROLEUM EXPLORATION
DEPTH DRILLED**



**DIAGRAM 14.5
PRIVATE PETROLEUM EXPLORATION
EXPLORATION EXPENDITURE**

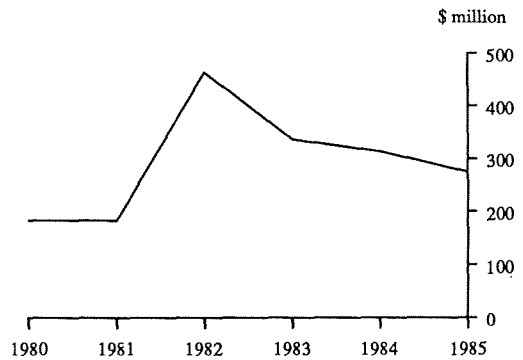
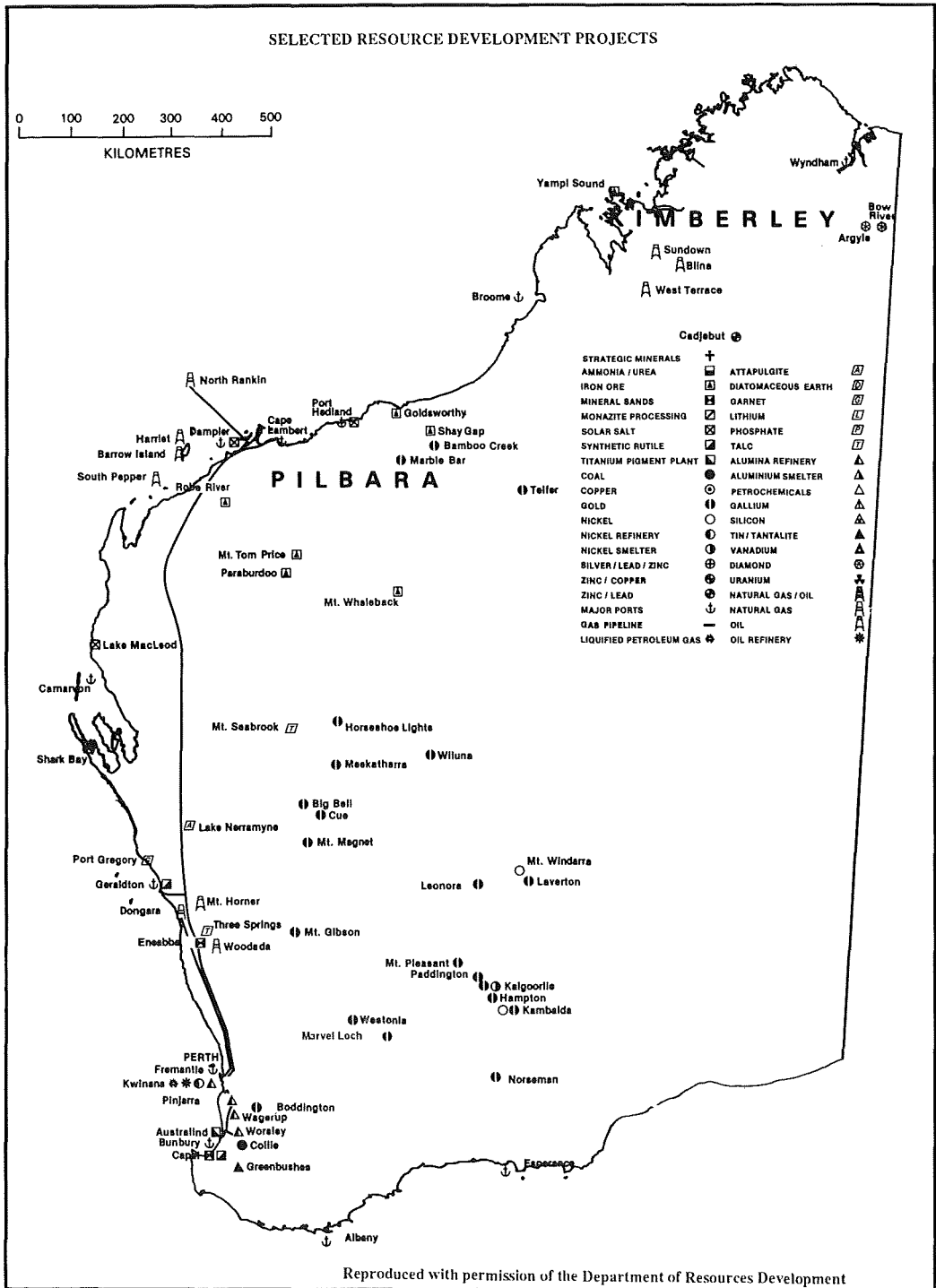


TABLE 14.8 - PRIVATE PETROLEUM EXPLORATION—WELLS AND DEPTH DRILLED

<i>Particulars</i>	<i>Unit</i>	<i>1984</i>	<i>1985</i>	<i>1986</i>
Wells—				
Drilled (i.e. those which reached final depth)—				
As oil producers	No.	19	20	1
As gas producers	No.	-	-	1
As oil and gas producers	No.	2	2	1
Plugged and abandoned	No.	52	44	15
Total	No.	73	66	18
Average final depth of wells drilled	metres	(a)1,570	1,847	2,058
Drilling still in progress at 31 December (Uncompleted holes)	No.	3	-	1
Drilled or drilling over 3,000 metres	No.	4	8	2
Depth drilled—				
Completed wells	metres	(a)112,042	116,947	37,046
Uncompleted holes	metres	(a)5,970	-	91
Total	metres	(a)118,012	116,947	37,137

(a) Includes South Australian offshore.

DIAGRAM 14.6



REFERENCES

Mineral Production:Australia (8405.0)

ABS Publications

Mining: Western Australia (8404.5)

*Census of Mining Establishments: Details of
Operations by Industry Class:Australia*
(8402.0)

Mineral Exploration:Australia (8407.0)

Chapter 15

ENERGY

The availability of energy is an important factor in the economic and social development of any country, and this is no less so in Australia, which ranks among the highest per capita energy users in the world. In Western Australia, the per capita energy consumption is some 10 per cent higher than that for the rest of Australia, primarily because of two factors:

- (a) The vast area of the State in relation to its population and the resultant high demand for transport energy.
- (b) The development and expansion of large scale mining and mineral processing industries since the mid 1960s which has added considerably to energy demand.

Energy, its sources, prices, distribution and related aspects are thus of considerable significance to this State.

For many years, Western Australia's only major indigenous source of primary energy (other than firewood and wind power) was black coal, which has been mined in the Collie region since the 1890s. Production of crude oil at Barrow Island (1967) and natural gas at Dongara (1971) further broadened the State's energy supply base. More recently, large deposits of natural gas in the North West Shelf area of Western Australia have been developed. Production from this source commenced in 1984.

Several deposits of energy minerals are at various stages of exploration, evaluation or development. In addition, research and development work continues on the various alternative sources of energy including solar and wind energy.

While Western Australia is still dependent on imports of some petroleum products, it is considerably more energy self-sufficient than it was in the early 1960s. One of the factors influencing previous economic development of this State has been the limited availability of local energy supplies. With the development of the North West Shelf natural gas project, a substantial energy surplus has been created for the first time in the history of the State.

Energy resources

Western Australia's resources of energy minerals are shown in Table 15.1. To put these resources data into perspective, recent State production data have also been shown.

TABLE 15.1 - FUEL MINERALS—RESOURCES AND PRODUCTION

(Sources: Bureau of Mineral Resources;
Western Australian Department of Mines)

Type	Unit	Re-sources at 31.12.87	Pro-duction 1987
Hydrocarbon liquids (a)	million cu m	(b)164	2.5
Natural gas	million cu m	(b)1,781,000	4,216
Black coal	million tonnes	739	3.7
Uranium	tonnes U ₃ O ₈	52,000	-

(a) Crude oil, condensate and liquefied petroleum gas (LPG). (b) Probability greater than 50 per cent that resources shown are recoverable.

The resources data shown represent amounts which are expected to be profitably extractable, given existing knowledge of mineral deposits, current prices and technology. Resources data are therefore subject to considerable revision if any of these factors change.

While it is not possible to quantify such resources, Western Australia's geographical and climatic characteristics are such that it has considerable potential to take advantage of advances in the use of solar, wind and biomass energy, as well as tidal power.

ENERGY PRODUCTION, CONVERSION AND UTILISATION

Electricity

Most of the electricity production in the State is generated by the State Energy Commission of Western Australia (SECWA)

whose responsibilities include ensuring the effective and efficient use of the State's energy resources and the provision of economical and reliable supplies of electricity and gas. Significant amounts of electricity are also generated by private enterprise, particularly large scale mining companies in the Pilbara region. Table 15.2 shows details of electricity produced in Western Australia over the last three years.

TABLE 15.2 - PRODUCTION OF ELECTRICITY
(million kWh)

Generated by	1984-85	1985-86	1986-87
Government	6,841	7,102	7,562
Private	2,757	2,874	2,850
Total	9,598	9,976	10,412

SECWA operates two power grid systems which supply the electricity needs of 98 per cent of the State's population. The two systems are:

- (a) *The South-West interconnected system* servicing an area from Kalbarri in the north to Albany in the south and from Perth east to Kalgoorlie. Three major thermal power stations provide the bulk of electricity for the system. They are located at Muja (1,040MW capacity) and Bunbury (120MW), both coal fired; and at Kwinana (900MW), mainly fuelled by North West Shelf natural gas. Gas turbines at Kwinana, Geraldton and Kalgoorlie (each of 20MW capacity) provide peak and emergency power. At 30 June 1987, the installed capacity of generating plant within this system was 2,102MW.
- (b) *The Pilbara interconnected system* interconnecting Karratha, Dampier, Cape Lambert, Wickham, Roebourne and Port Hedland. Electricity is supplied from Cliffs Robe River Iron Associates' gas-fired power station at Cape Lambert. Additional power can be drawn from the SECWA stand-by diesel generating facility at Port Hedland and from Hamersley Iron Pty Ltd's power station at Dampier.

Details of fuels used by SECWA for electricity generation are shown in Table 15.3.

TABLE 15.3 - STATE ENERGY COMMISSION OF
WESTERN AUSTRALIA
FUELS USED FOR ELECTRICITY GENERATION

Fuel	Unit	1984-85	1985-86	1986-87
Coal	'000 tonnes	3,360	2,387	2,333
Fuel oil	'000 tonnes	60	32	19
Distillate	'000 tonnes	55	52	54
Natural gas	Terajoules	4,604	27,700	34,442

Outside the electricity grid systems, SECWA operates another twenty-nine smaller diesel power stations with a total capacity of 170MW. It also provides support services for the Federal Department of Aboriginal Affairs to help run thirty-eight Aboriginal village power stations in remote areas of the State.

At 30 June 1987, SECWA had 555,698 customer accounts for electricity throughout Western Australia.

Petroleum fuels

Until 1954, Western Australia was wholly dependent on imports for its supplies of petroleum fuels. The opening of an oil refinery at Kwinana in that year brought some local input into petroleum fuel production although, initially, all the feedstock for the refinery was imported.

The first commercial deposits of oil were found on Barrow Island, off the north-west coast of the State, in 1964 and shipments commenced in 1967. This oil is refined at several Australian refineries, including Kwinana.

In 1966, natural gas was discovered at Dongara, to the north of Perth. At that time gas manufactured from (mainly Collie) coal and naphtha (a light distillate) was being reticulated by SECWA and the Fremantle Gas and Coke Company within the Perth Metropolitan Area. A pipeline was later constructed linking Dongara with the metropolitan gas mains system and with Pinjarra south of Perth. The replacement of manufactured gas commenced in December 1971 and was completed before the end of 1972. On 1 October 1986, SECWA purchased the gas reticulation facility operated by the Fremantle Gas and Coke Company.

Gas supplies from the Dongara and nearby Woodada fields are now largely exhausted, and SECWA almost exclusively uses supplies from the North West Shelf to service its customers. SECWA also reticulates tempered liquefied petroleum (TLP) gas, using

feedstock provided by a Kwinana refinery, to customers in Albany on the south coast.

At 30 June 1987, there were 193,700 customer accounts for natural gas and 2,360 customer accounts for TLP gas.

The North West shelf project is based on the use of the North Rankin and Goodwyn gasfields which contain expected recoverable hydrocarbons currently estimated at 319,000 million cubic metres of gas and 60 million cubic metres of condensate (with a 75 per cent cumulative probability that these volumes are recoverable). In North Rankin, the first field to be developed, the natural gas is trapped in layers of porous sandstone, more than three kilometres below the sea floor. The gas-saturated sandstone beds have a cumulative thickness of approximately 300 metres and extend over an area of more than 50 square kilometres.

Construction of the offshore and onshore facilities for the project is being carried out in two phases. The first (the Domestic Gas Phase) is to supply gas to Western Australia, while the second (the Liquefied Natural Gas (LNG) phase) is to supply LNG to Japan.

When both phases are fully operational at planned plateau production levels, output from the project will include:

- (a) 10.9 million cubic metres of gas per day for the domestic market in Western Australia.
- (b) 6 million tonnes of LNG per year for the Japanese market.
- (c) 1.4 million tonnes of condensate per year.

In 1984 SECWA constructed a 1,500 kilometre pipeline from Dampier to Wagerup, at a cost of approximately \$1,000 million, to carry gas to its Perth distribution network, and to major industrial customers in the South-West of the State. Since that time, the pipeline has been extended to Bunbury, and lateral lines constructed to Geraldton and major industrial customers in the Pilbara. Diagram 14.6 in Chapter 14 shows the location of the North West Shelf project and of the pipeline.

Petroleum exploration has continued at a high level in recent years. Statistics relating to this activity and to the production of

crude oil and natural gas are contained in tables in Chapter 14.

Table 15.4 shows sales of petroleum products in Western Australia. The data relate only to sales of refinery products (whether produced in this State or imported), and hence exclude products such as natural gas, which do not go through a refining process; or crude oil, which is a refinery input.

TABLE 15.4 - SALES (a) OF PETROLEUM PRODUCTS
(Source: Department of Primary Industries and Energy)
(megalitres)

	1984-85	1985-86	1986-87
LPG	95	93	81
Automotive gasoline—			
Premium	1,471	1,488	1,437
Regular	35	1	-
Unleaded (b)	3	43	122
<i>Total</i>	<i>1,509</i>	<i>1,532</i>	<i>1,559</i>
Aviation gasoline	16	15	16
Aviation turbine fuel	255	279	300
Automotive diesel oil—			
Inland	1,391	1,345	1,430
Bunkers	29	13	12
<i>Total</i>	<i>1,420</i>	<i>1,358</i>	<i>1,442</i>
Industrial and marine diesel fuel—			
Inland	4	2	-
Bunkers	66	57	59
<i>Total</i>	<i>70</i>	<i>59</i>	<i>59</i>
Fuel oil—			
Inland	534	183	111
Bunkers	280	197	190
<i>Total</i>	<i>814</i>	<i>380</i>	<i>301</i>
Lubricating oils and greases	56	55	57
Bitumen	64	59	59
Lighting kerosene	36	28	28
Other products (c)	71	64	58
Total products	4,405	3,922	3,958

(a) Includes reporting companies' own use, but excludes refinery fuel. (b) Sales of unleaded petrol commenced on 1 July 1985. (c) Includes heating oil.

Coal

Commercial production of coal commenced in the 1890s at Collie. For many years coal was the major source of energy in the State, being used to generate electricity, to manufacture 'town' gas and to provide fuel for steam locomotives and industry generally. Today, the major user of coal mined in the Collie basin is SECWA. Coal is the main fuel for electricity generation for SECWA's South-West interconnected system.

Data showing trends in coal production since 1900 are contained in the Statistical Summary, Chapter 26.

Apart from the deposits being worked at Collie, several other deposits of both black and brown coal have been identified and are at present being evaluated. Details of exploration for coal are contained in Table 14.5 in Chapter 14.

Solar energy

The use of solar radiation for the production of domestic hot water is well established in Western Australia, and is the most common application of solar energy. In 1985-86, over 23 per cent of private dwellings in the State had solar hot water systems, and such systems are accepted as being competitive with other forms of domestic water heating.

There is also a well established use of photovoltaic cells which convert light directly into electrical energy for the refrigeration of food, and basic lighting and radio communications equipment in remote localities. More recent developments have been the use of solar energy for water and space heating in commercial applications.

At present, economical application of solar energy is largely restricted to relatively small scale heating purposes, with some more sophisticated applications in remote localities where factors such as the transport costs of conventional fuels are significant.

Biomass

Biomass, relates to living matter which can be used as a source of energy and it includes matter which can be used directly as a fuel (e.g. firewood) or after conversion (e.g. sugar cane converted to sugar, sugar converted to ethanol). The concept of biomass includes organic waste materials such as sawdust and crop refuse, but excludes fossil fuels such as coal and petroleum. The most significant form of biomass to have been used as an energy source in Western Australia is firewood, and this is still an important source of household energy.

Research is at present continuing on the further use of biomass as an energy source. This is largely concerned with the use of oil from oil-seed crops in diesel-type engines, and the production of ethanol from sugar, grain crops and organic waste materials.

Uranium

No uranium has been mined on a commercial basis in Western Australia to date, though small amounts of ore have been extracted and processed for test purposes. A number of uranium ore bodies have been identified in the State, and exploration for this mineral is continuing. Details of amounts expended on uranium exploration in recent years are included in Table 14.5 in Chapter 14.

Wind energy

Wind power was of some significance as an energy source in the early days of settlement and is still used extensively in agricultural and pastoral areas for pumping water for stock. A wind power generator is being used to augment the electricity supply on Rottnest Island. At Salmon Beach, a few kilometres west of the south coastal town of Esperance, six 60 kilowatt aero-generators were commissioned by SECWA in March 1987 to augment the local electricity supply.

Owing to its intermittent nature, wind power does not at present appear a viable large scale source of energy, particularly in view of the high costs of electricity storage. However, for small scale applications, particularly in remote areas where transport costs of conventional fuels are a significant factor, there are prospects for extending the use of wind power beyond its present major application in the pumping of water.

Other energy sources

There are several other energy sources which have potential use in Western Australia. A small hydro-electricity plant is currently in operation at Collie. There are several sites in the Kimberley region in the north of the State which would be suitable for hydro-electricity generation, including the existing dam on the Ord River. Parts of the Kimberley coastline, where very large tidal ranges occur, have been identified as suitable sites for tidal electricity generation. Some small deposits of oil shale have been identified in the south-east of the State.

Research

The principal energy research organisations in Western Australia are SECWA, the Minerals and Energy Research Institute of Western Australia (MERIWA) and Murdoch

University's Energy Research Institute (MURI).

SECWA is primarily responsible for the efficient and effective use of energy resources available to the State of Western Australia. Consistent with this responsibility it is engaged in an active program of investigation and evaluation of alternative sources and applications of energy which may become significant in the future.

SECWA has undertaken studies into the use of alternative fuels for power generation and for use in motor vehicles. Vegetable oils have been tested with some success as alternative liquid fuels for generating electricity and tests are continuing into the use of LPG and compressed natural gas in both light vehicles and buses operated by the Metropolitan (Perth) Passenger Transport Trust.

MERIWA approves and arranges funding for projects intended to develop or demonstrate uses of solar and alternative forms of energy which have potential for economically viable application in the short to medium term. These include projects ranging from energy storage systems to the use of various forms of biomass.

MURI is principally involved in research and development of solar energy (solar radiation) systems. In addition, MURI carries out a range of tests for manufacturers and research workers on a confidential basis.

Since 1984, staff engaged at MURI have undertaken field trials in remote areas on photovoltaic systems for producing electricity. Staff are now engaged in developing systems suitable for remote Aboriginal communities, under funding from the Federal Departments of Aboriginal Affairs and Primary Industries and Energy.

There are also a number of other testing facilities in the State, some operating under contract. These facilities, and the institutions responsible for operating them include:

- (a) Corrosion Testing Facility—Curtin University of Technology.
- (b) Materials Performance Testing Facility—Curtin University of Technology.
- (c) Materials Standards Laboratory—University of Western Australia.

NATIONAL ENERGY SURVEY OF HOUSEHOLDS

National Energy Surveys were conducted by the Australian Bureau of Statistics in November 1980, June 1983 and over the twelve months commencing 17 June 1985. The surveys were based on a sample of private dwellings but excluded certain types of dwellings, such as non-private dwellings (hospitals, hotels, motels, etc.), caravan parks and dwellings occupied by more than one household. Also excluded were foreign diplomatic personnel and members of non-Australian defence forces stationed in Australia.

The 1985-86 Survey sought information about the types of domestic appliances held and water heating facilities, room heating, air-conditioning, insulation and swimming pools installed. Additional data obtained were: the number of adults and children and gross income of the household; consumption of electricity and reticulated gas by households over a twelve-month period; and the number of rooms in the dwelling. Table 15.5 shows a summary of the survey results. Detailed information appears in the publication *National Energy Survey: Household Appliances, Facilities and Insulation, Australia* (Catalogue No. 8212.0).

TABLE 15.5 - HOUSEHOLDS BY MAJOR APPLIANCES AND FACILITIES: JUNE 1983 AND 1985-86
WESTERN AUSTRALIA AND AUSTRALIA

	Western Australia			Australia		
	June 1983	1985-86		June 1983	1985-86	
	Per cent (a)	'000 Per cent (a)		Per cent (a)	'000 Per cent (a)	
Refrigerator	99.7	460.7	99.6	99.6	5,023.5	99.6
Freezer	46.4	210.3	45.5	46.0	2,342.4	46.4
Hot plates	97.5	455.7	98.5	97.7	4,953.1	98.2
Oven	99.1	456.0	98.6	99.0	4,980.4	98.7
Microwave oven (b)	12.9	154.8	33.5	10.0	1,509.5	29.9
Electric frypan/skillet (b)	35.9	301.1	65.1	38.0	3,521.2	69.8
Vertical grill (b)	5.7	53.7	11.6	6.9	777.7	15.4
Dishwasher	13.1	68.5	14.8	17.1	995.2	19.7
Washing machine	92.1	425.8	92.0	91.8	4,684.6	92.9
Clothes dryer	30.1	159.1	34.4	45.2	2,428.3	48.1
Ceiling fan (c)	(d)	113.0	24.4	(d)	852.7	16.9
Air conditioning	37.1	186.4	40.3	32.3	1,783.0	35.3
Main heating, non-shared—						
Electric	30.4	130.3	28.2	44.2	2,103.1	41.7
Gas	15.3	82.8	17.9	21.9	1,232.1	24.4
Oil	12.9	42.3	9.2	7.6	281.3	*5.6
Wood/solid fuel	21.3	120.1	26.0	12.4	794.6	15.8
Total	92.5	421.9	91.2	92.5	4,646.8	92.1
Hot water system (e)	99.0	459.6	99.2	98.7	5,001.8	98.9
Wall insulation (f)	4.6	21.3	4.9	*12.1	672.8	*15.0
Roof insulation (f)	39.2	201.5	46.2	43.7	2,239.4	49.8
Swimming pool (f)	12.7	56.6	13.0	10.1	518.3	11.5
Bore/well pump (f)	(d)	96.4	22.1	(d)	279.5	6.2
Total households	100.0	462.6	100.0	100.0	5,044.1	100.0

(a) Percentage of total households. (b) For June 1983, included only if used more than once a week. For 1985-86, included if the household had any of the appliances as distinct from actually using them. (c) Permanently fixed large bladed fans only. (d) Not asked. (e) Includes shared systems. (f) Not asked at flats, mobile, and improvised dwellings. *Care should be exercised when using this figure—subject to high sampling variability.

REFERENCES

ABS publications

National Energy Survey: Household Appliances, Facilities and Insulation, Australia, 1985-86 (8212.0).

National Energy Survey: Household Energy Consumption, Australia, 1985-86 (8213.0).

Other publications

State Energy Commission of Western Australia, *Annual Report 1987*.

Department of Primary Industries and Energy, *Major Energy Statistics*.

Western Australian Department of Mines, *Petroleum in Western Australia*.

Chapter 16

MANUFACTURING

Western Australia's manufacturing base is small compared to the rest of Australia. However, the State's manufacturing industry is heavily orientated towards the development of its mineral resources, and in this area Western Australia is an important contributor to the Australian aggregates. In particular, Western Australia is second only to New South Wales in the manufacture of base metal products.

Up to the early 1950s, most Western Australian factories were small and medium sized establishments supplying the small local market and carrying out some processing of the State's primary products for export. Acute shortages of capital and raw materials (including energy supplies) had affected the development of secondary industry.

The discoveries of Western Australia's large mineral resources provided the impetus for heavy industry and large scale operations. As well, an integrated industrial complex was established with the opening in 1954 of a large oil refinery at Kwinana, on Cockburn Sound south of Perth. This interrelated complex of metal, fuel and chemical plants is served by a harbour, railway lines linked with mining centres and the other States, and pipelines from the natural gas fields north of Perth.

A major portion (in terms of turnover) of Western Australia's manufacturing industry has been centred around local materials such as minerals, forests, and the products of farms and fisheries. Industries such as alumina production, nickel smelting, clay brick production, log sawmilling, woodchips, abattoirs and the processing of rock lobsters are all based on the ready availability of these raw materials in Western Australia.

In recent years there have been few new major projects in the manufacturing sector, however, efforts to stimulate new projects based on Western Australia's huge gas and other mineral resources are starting to yield results.

A more comprehensive picture of the history of manufacturing in Western Australia can be found in the *Western Australian Year Book*, No. 24 - 1986.

Two Government bodies are responsible for encouraging the establishment of new industries in Western Australia.

Technology and Industrial Development Authority (TIDA)

TIDA was established in June 1987. Its goal is to broaden the State's industrial and technological base by encouraging the establishment of new industries based on advanced technology.

The Authority monitors world movements in specific areas of technological growth. It identifies opportunities for, and assists with investments in technology and industry in Western Australia. It also develops strategic overseas markets and helps companies access these markets.

Department of Resources Development

As mentioned in Chapter 14, Mining, this Department facilitates major development projects based on Western Australia's huge mineral resources.

MANUFACTURING STATISTICS

Western Australia's manufacturing activity is concentrated in the Perth Statistical Division. The region has about 80 per cent of all manufacturing establishments and manufacturing employment but approximately 70 per cent of the total population of the State. The region's contribution to the State's value added and turnover is about 70 per cent. In contrast the South-West Statistical Division has approximately 8 per cent of the State's population, 10 per cent of all manufacturing establishments and manufacturing employment, but has about 20 per cent of turnover and value added.

TABLE 16.1 - MANUFACTURING ESTABLISHMENTS — SUMMARY OF OPERATIONS BY STATISTICAL DIVISION 1984-85

(Note: Data in this table exclude operations by single establishment manufacturing enterprises employing less than four persons).

Statistical division	Establishments at 30 June	Persons employed (a)	Wages and salaries (b)	Turnover	Value added
	No.	No.	\$m	\$m	\$m
Perth Statistical Division	1,964	52,449	910.1	4,787.6	1,725.1
Other divisions—					
South-West	190	6,425	133.8	1,268.4	515.4
Lower Great Southern	62	1,406	20.9	111.3	40.4
Upper Great Southern	25	208	2.2	12.9	4.6
Midlands	56	561	8.0	75.1	19.5
South-Eastern	49	1,057	20.0	294.8	109.7
Central	52	929	12.7	140.2	47.1
Pilbara	35	927	22.6	61.1	37.7
Kimberley	18	280	7.1	37.2	13.5
Total	487	11,793	227.5	2,000.8	788.1
Western Australia	2,451	64,242	1,137.6	6,788.5	2,513.2

(a) Average over whole year. Includes working proprietors. (b) Excludes amounts drawn by working proprietors.

Despite the growth in Western Australia's secondary industry since the 1950s, the State's contribution to Australia's manufacturing sector remains small. The proportion

the State contributes in this sector (see Table 16.2) is paralleled in population statistics where Western Australia has 9.2 per cent of the population total for Australia.

TABLE 16.2 - MANUFACTURING ESTABLISHMENTS (a) OPERATING AT 30 JUNE 1985
SELECTED VARIABLES BY EMPLOYMENT SIZE
WESTERN AUSTRALIA AND AUSTRALIA

Particulars	Less than 4 persons	4-9 persons	10-19 persons	20-49 persons	50-99 persons	100 or more persons	Total
WESTERN AUSTRALIA							
No. of establishments	1,451	1,359	500	351	134	107	3,902
Employment	2,996	7,698	7,086	11,166	9,877	27,519	66,342
Wages and salaries (\$m)	14.1	90.8	100.0	178.0	166.7	557.7	1,107.3
Turnover (\$m)	n.a.	559.2	513.7	965.4	1,149.0	3,542.0	(a)6,729.4
Value added (\$m)	n.a.	198.2	209.0	344.0	402.0	1,342.6	(a)2,495.8
AUSTRALIA							
No. of establishments	14,243	13,462	5,981	4,335	1,849	1,984	41,854
Employment	29,499	77,657	82,088	134,549	130,516	573,711	1,028,020
Wages and salaries (\$m)	195.4	962.6	1,203.3	2,200.5	2,280.8	11,377.4	18,220.0
Turnover (\$m)	n.a.	5,244.6	5,920.2	11,930.4	13,548.4	61,014.3	(a)97,657.9
Value added (\$m)	n.a.	1,975.4	2,423.8	4,598.8	5,188.2	24,071.8	(a)38,258.1
WESTERN AUSTRALIA AS A PERCENTAGE OF AUSTRALIA							
No. of establishments	10.2	10.1	8.4	8.1	7.2	5.4	9.3
Employment	10.2	9.9	8.6	8.3	7.6	4.8	6.5
Wages and salaries	7.2	9.4	8.3	8.1	7.3	4.9	6.1
Turnover	n.a.	10.7	8.7	8.1	8.5	5.8	(a)6.9
Value added	n.a.	10.0	8.6	7.5	7.7	5.6	(a)6.5

(a) Excludes single establishment enterprises employing less than 4 persons.

Western Australian manufacturing establishments employing 100 or more persons account for only 3 per cent of total establishments, but about half of employment, wages and salaries, value added and turnover. In comparison, Australian manu-

facturing establishments employing 100 or more persons account for 5 per cent of total establishments, 60 per cent of employment, wages and salaries, value added and turnover.

**TABLE 16.3 - MANUFACTURING ESTABLISHMENTS
SUMMARY OF OPERATIONS BY INDUSTRY SUBDIVISION**
(Manufacturing establishments of multi-establishment enterprises, and single establishment manufacturing enterprises employing four or more persons.)

ASIC code(c)	Industry subdivision Description	Establishments operating at 30 June	Persons employed (a)	Wages and salaries (b)	Turnover	Value added
		No.	No.	\$m	\$m	\$m
		1984-85				
21	Food, beverages and tobacco	369	11,990	195.3	1,494.3	453.7
23	Textiles	38	987	14.8	75.1	31.4
24	Clothing and footwear	60	1,452	17.8	50.3	29.7
25	Wood, wood products and furniture	417	7,863	106.7	479.2	224.1
26	Paper, paper products, printing and publishing	221	7,091	120.6	402.8	214.3
27	Chemical, petroleum and coal products	69	3,029	62.9	516.7	169.2
28	Non-metallic mineral products	199	4,462	86.1	459.0	197.7
29	Basic metal products	40	6,081	162.7	1,836.5	578.2
31	Fabricated metal products	395	6,731	112.1	531.9	194.4
32	Transport equipment	150	4,802	92.0	251.7	126.4
33	Other machinery and equipment	325	7,146	126.0	485.7	210.9
34	Miscellaneous manufacturing	168	2,608	40.6	205.5	83.1
	Total Manufacturing 1984-85	2,451	64,242	1,137.6	6,788.5	2,513.2
	1983-84	2,408	61,997	1,047.4	5,922.7	2,136.7
	1982-83	2,499	64,980	1,038.3	5,596.5	2,040.9

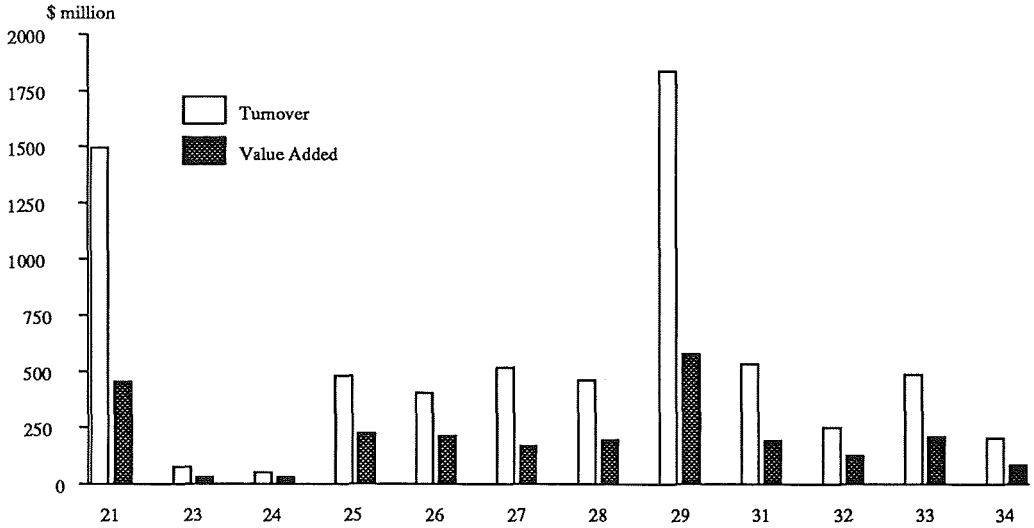
(a) Average over whole year. Includes working proprietors. (b) Excludes amounts drawn by working proprietors. (c) Australian Standard Industrial Classification.

**TABLE 16.4 - MANUFACTURING ESTABLISHMENTS:
SUMMARY OF OPERATIONS BY INDUSTRY SUBDIVISION**
(Single establishment manufacturing enterprises employing less than four persons.)

ASIC code(c)	Industry subdivision Description	Establishments operating at 30 June	Persons employed (a)	Wages and salaries (b)
		No.	No.	\$m
		1984-85		
21	Food, beverages and tobacco	111	251	0.9
23	Textiles	27	57	0.3
24	Clothing and footwear	29	55	0.3
25	Wood, wood products and furniture	416	853	3.5
26	Paper, paper products, printing and publishing	103	229	1.1
27	Chemical, petroleum and coal products	22	n.p.	n.p.
28	Non-metallic mineral products	58	111	0.5
29	Basic metal products	14	n.p.	n.p.
31	Fabricated metal products	250	525	2.8
32	Transport equipment	92	183	0.9
33	Other machinery and equipment	166	340	2.0
34	Miscellaneous manufacturing	163	325	1.5
	Total Manufacturing 1984-85	1,451	2,996	14.1
	1983-84	1,567	3,231	12.8
	1982-83	1,452	2,897	9.7

(a) Includes working proprietors. (b) Excludes amounts drawn by working proprietors. (c) Australian Standard Industrial Classification.

DIAGRAM 16.1
MANUFACTURING ESTABLISHMENTS: WESTERN AUSTRALIA
TURNOVER AND VALUE ADDED BY INDUSTRY SUBDIVISION (a) 1984-85



(a) Refer to Table 16.3 for description of Industry Subdivisions

There has been a gradual decline in the number of persons employed by the Western Australian manufacturing industry as a proportion of the estimated resident popula-

tion. At 30 June 1975 it was 5.9 per cent but by 30 June 1985 it was only 4.7 per cent of the estimated resident population.

DIAGRAM 16.2
MANUFACTURING ESTABLISHMENTS
EMPLOYMENT

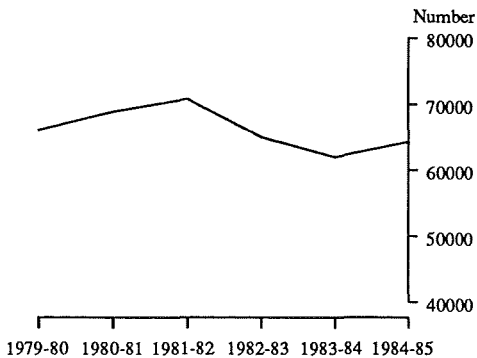


DIAGRAM 16.3
MANUFACTURING ESTABLISHMENTS
WAGES AND SALARIES

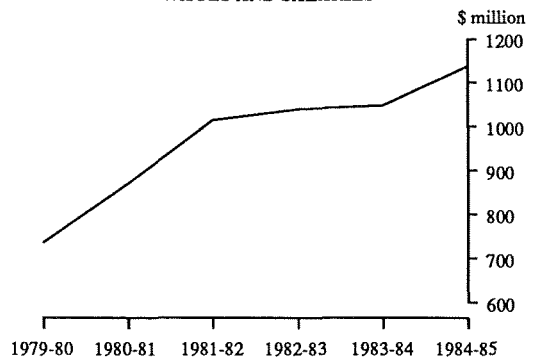


TABLE 16.5 - PRODUCTION OF SELECTED COMMODITIES
(Includes quantities produced and used in own establishment)

Commodity	Unit	1984-85	1985-86	1986-87
Aerated and carbonated waters (a)(b)	'000L	(b)117,226	(b)120,712	106,360
Alumina (c)	'000t	5,327	5,431	5,727
Automotive 12 volt batteries (a)	number	20,687	16,784	18,855
Bacon and ham (a)	tonnes	7,862	8,174	8,528
Butter (d)		1,582	1,595	1,400
Cheese (d)		3,736	3,417	3,720
Cordials and syrups (a)	'000L	6,571	4,597	5,646
Footwear (a)(e)	pairs	263,450	286,073	276,036
Ice cream (a)	'000L	18,990	15,217	16,872
Inedible tallow (a)	tonnes	31,229	30,354	30,706
Paints (a)(f)	'000L	5,363	6,097	5,888
Ready-mixed concrete (a)	'000cu m	1,104.9	1,350.4	1,265.4
Rock lobster tails (a)(g)	tonnes	3,405	2,820	2,672
Scoured wool from greasy shorn wool (a)		21,938	22,992	26,340
Soap and soap substitutes (a)(h)		6,003	6,157	7,033
Stock and poultry foods (a)—				
Meat and bone meal		33,887	35,667	37,022
Prepared stock and poultry food		240,114	270,609	305,141
Solar collectors (a)	sq metres	124,729	115,405	92,627
Terracotta and concrete tiles (a)(i)	'000 sq m	3,145	3,386	2,963
Timber (j)—				
Local logs sawn	cu metres	859,459	918,286	898,839
Sawn timber produced		305,327	324,962	309,523

(a) Excludes production by single establishment manufacturing enterprises employing less than four persons, and by establishments predominantly engaged in non-manufacturing activities. (b) Prior to July 1986, includes very low alcohol beer. (c) Source: Department of Mines. (d) Source: Australian Dairy Corporation. (e) Excludes footwear wholly of rubber. (f) Excludes stains and thinners. (g) Prepared and/or preserved by chilling or freezing. (h) Includes detergents. (i) Excludes roofing accessories such as ridge cappers. (j) Derived from data supplied by the Department of Conservation and Land Management.

REFERENCES

ABS Publications

Census of Manufacturing Establishments: Industry and Area Data: Western Australia. (8202.5)

Census of Manufacturing Establishments: Selected Items of Data Classified by Industry and Employment Size: Western Australia. (8203.5)

Census of Manufacturing Establishments: Details of Operations by Industry Class: Australia. (8203.0)

Census of Manufacturing Establishments: Selected Items of Data Classified by Industry and Employment Size: Australia. (8204.0)

Manufacturing Commodities: Principal Articles Produced: Australia. (8303.0)

Chapter 17

INTERNAL TRADE

WHOLESALE TRADE

Wholesale trade is described as the resale of new or used goods to retailers and other business users (including farmers, builders, government and professional bodies).

A sample survey of wholesale establishments was conducted in respect of the year ended 30 June 1982 and provides the latest information available about the wholesale sector. Estimates were produced at the national level and are contained in *Wholesale Establishments, Details of Operations by Industry Class, Australia* (Catalogue No. 8638.0).

RETAIL TRADE

Retail trade is described as the re-sale of new or used goods to final consumers for personal or household consumption. Detailed information about the retail sector has been collected using Censuses of Retail Establishments, the first of which was taken in respect of the year 1947-48. Eight censuses have been taken since then. Results from each census are published for each State and Territory and for Australia as a whole.

Surveys of retail trade, which were introduced from 1956, have enabled the production of estimates of retail trade on a less detailed but more frequent basis.

Census of Retail Establishments

The most recent census was taken in respect of the year ended 30 June 1986 and included all establishments classified to the Retail Trade subdivision of the Australian Standard Industrial Classification (ASIC), excluding bread and milk vendors, shoe repairers and electrical appliance repairers not elsewhere classified. Builders' hardware dealers were included for the first time.

Operations of each retail industry group are summarised in Table 17.1.

The growth of the retail sector in Western Australia is illustrated in Table 17.2 which compares 1985-86 census results with those of the previous census, conducted in respect of 1979-80. To enable comparison, adjustments have been made to 1979-80 data to compensate for scope differences between the two censuses. 1979-80 turnover is expressed in terms of average 1985-86 prices.

TABLE 17.1 - RETAIL ESTABLISHMENTS
SUMMARY OF OPERATIONS BY INDUSTRY GROUP: 1985-86

<i>ASIC group description</i>	<i>Establishments at 30 June</i>	<i>Persons employed at 30 June (a)</i>	<i>Wages and salaries (b)</i>	<i>Turnover</i>
	No.	'000	\$ m	\$ m
Retail establishments—				
Department and general stores	62	9.6	97.9	737.5
Clothing, fabric and furniture stores	1,963	7.8	73.3	657.2
Household appliance and hardware stores	1,297	5.0	50.2	553.1
Motor vehicle dealers, petrol and tyre retailers	3,750	19.8	234.9	3,431.4
Food stores	4,347	32.2	235.5	2,414.8
Other retailers	2,641	8.9	58.3	611.1
Total retail establishments	14,060	83.3	750.1	8,405.0

(a) Includes working proprietors. (b) Excludes drawings of working proprietors.

TABLE 17.2 - CENSUSES OF RETAIL ESTABLISHMENTS, WESTERN AUSTRALIA AND AUSTRALIA : 1979-80 AND 1985-86

	Western Australia			Australia		
	1979-80	1985-86	Increase (per cent)	1979-80	1985-86	Increase (per cent)
Establishments (at 30 June)	12,335	14,060	14.0	142,063	160,160	12.7
Persons employed ('000)	69.9	83.3	19.1	790.5	928.5	17.5
Turnover (\$m)	6,545.3	8,405.0	28.4	74,140.6	92,406.5	24.6

The growth in establishments, persons employed and turnover experienced in Western Australia over the five years exceeds that experienced by Australia as a whole. In Western Australia average turnover per establishment increased by 12.7 per cent from \$530,626 in 1979-80 to \$597,798 in 1985-86. This compares with a national increase of 10.6 per cent, from \$521,885 in 1979-80 to \$576,964 in 1985-86. In Western Australia, turnover per person employed increased from \$93,603 to \$100,894, a rise of 7.8 per cent, whereas the increase for Australia was 6.1%, from \$93,790 to \$99,522.

Survey of Retail Establishments

Since 1956 intercensal estimates of the value of retail sales have been produced by means of sample surveys. Surveys were initially conducted quarterly but are now conducted on a monthly basis. Estimates are published in *Retail Sales of Goods (excluding Motor Vehicles, Parts, Petrol, etc.)*, Australia (Catalogue No. 8501.0).

Estimates of retail sales (in current price terms) by industry group for the years 1984-85 to 1986-87 are provided in Table 17.3.

Diagrams 17.1 and 17.2, which relate to the 24 month period July 1985 to June 1987, illustrate the seasonal nature of retail sales, the long term upward trend in retail sales and the monthly variations that can occur. Data are presented in current price terms.

TABLE 17.3 - RETAIL ESTABLISHMENTS
ESTIMATES OF RETAIL SALES BY INDUSTRY
GROUP: 1984-85 TO 1986-87
(\$ million)

Industry group	1984-85	1985-86	1986-87
Grocers, confectioners, tobacconists	1,452.9	1,615.4	1,764.1
Butchers	71.3	74.1	65.3
General stores	68.5	76.0	92.1
Other food stores	266.3	313.5	323.6
Hotels, liquor stores, licensed clubs	539.8	624.5	673.5

TABLE 17.3 - RETAIL ESTABLISHMENTS
ESTIMATES OF RETAIL SALES BY INDUSTRY
GROUP: 1984-85 TO 1986-87—continued
(\$ million)

Industry group	1984-85	1985-86	1986-87
Clothing and fabric stores	356.5	420.0	456.5
Department stores	431.5	455.8	514.6
Footwear stores	74.4	85.4	86.6
Domestic hardware stores, jewellers	96.3	82.4	101.8
Electrical goods stores	278.0	277.9	283.0
Furniture stores	89.4	109.5	116.2
Floor coverings stores	42.0	66.6	64.9
Chemists	128.5	160.6	176.0
Newsagents	125.8	136.5	177.4
Other	172.1	211.2	223.7
Total	4,193.6	4,709.1	5,119.4

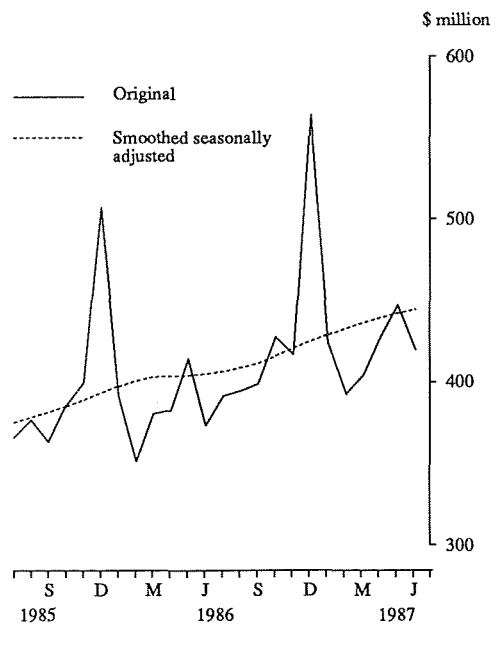
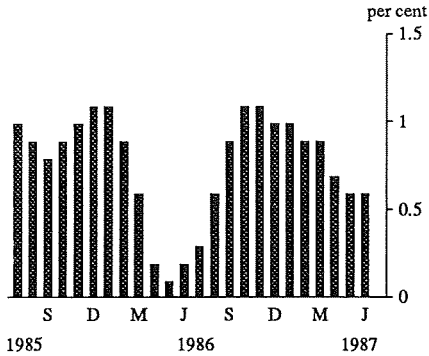
DIAGRAM 17.1
MONTHLY ESTIMATES OF RETAIL SALES

DIAGRAM 17.2

MONTHLY CHANGE IN RETAIL SALES



TOURISM

Responsibility for the development of the tourism industry in Australia is exercised by government bodies at Commonwealth, State and regional levels. At the State level the Western Australian Tourism Commission (WATC) is responsible for marketing Western Australia as a tourist destination for international, interstate and intrastate visitors.

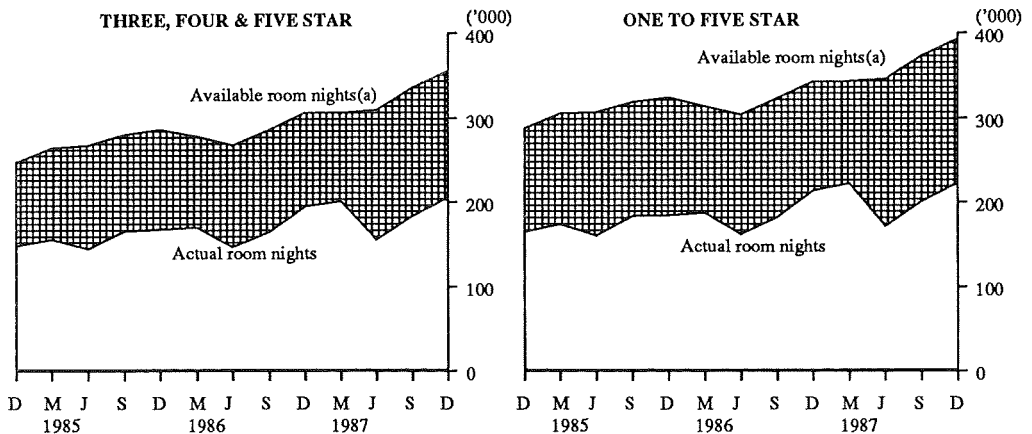
Information provided by the WATC shows that, during 1986-87, interstate and intrastate

visitors (persons aged 14 years and over) made 4.0 million trips to or within Western Australia. This represents 8.8 per cent of total domestic trips made within Australia. The major proportion (48 per cent) of trips to or within the State were 'pleasure or holiday' trips followed by 'visiting friends and relatives' trips (30 per cent). The main destination regions for domestic travel were Perth (35 per cent of trips) and the South-West (26 per cent).

Tourism is one of the largest growing industries in Western Australia as evidenced by the increased development of luxury hotels and tourist attractions over the last three years. As the State capital, Perth receives the majority of interstate and international visitors and, therefore, has experienced a major share of the development in tourist accommodation. In the three years to September 1987, three, four and five star hotel accommodation in the Perth metropolitan area has increased from 2,674 guest rooms to 3,659 guest rooms. These hotels offer facilities of international standard and boast six 5 star hotels, double the number of such hotels available three years ago. The quarterly growth in room nights available in three, four and five star hotels compared to actual room occupancy is shown in Diagram 17.3.

Development of tourism has not been restricted to Perth. The towns of Broome and

DIAGRAM 17.3
STAR GRADED HOTELS AND MOTELS
PERTH STATISTICAL DIVISION



(a) The total number of nights each guest room is available for occupancy during the quarter.

Kalbarri in the north and Margaret River in the south are also experiencing significant growth.

Table 17.4 shows the types and capacity of tourist accommodation available in Western Australia.

TABLE 17.4 - TOURIST ACCOMMODATION (a)
30 September 1987

	Perth Statistical Division	Rest of State	Western Australia
HOTELS AND MOTELS, WITH FACILITIES (b)			
Establishments	95	215	310
Guest rooms	6,509	6,585	13,094
Bed spaces	15,549	16,625	32,174
HOTELS AND GUEST HOUSES, WITHOUT FACILITIES (b)			
Establishments	19	153	172
Guest rooms	685	2,189	2,874
Bed spaces	1,088	3,984	5,072
CARAVAN PARKS (c)			
Establishments	32	251	283
Sites	3,325	20,359	23,684

(a) Hotels, motels and guest houses must have breakfast available for guests. Caravan parks must provide powered sites and toilet, shower and laundry facilities for guests.

(b) Establishments providing predominantly short term accommodation (i.e. for periods of less than two months).

(c) Establishments predominantly providing short term or long term accommodation.

TABLE 17.5 - HOTELS, MOTELS AND GUEST HOUSES

Year	Guest rooms(a)	Room occupancy rate	Guest arrivals	Takings (b)
	No.	per cent	'000	\$'000
1984-85	14,154	45	1,633	87,159
1985-86	14,346	46	1,653	99,719
1986-87	15,538	46	1,682	126,417

(a) At 30 June. (b) Takings only from accommodation.

TABLE 17.6 - CARAVAN PARKS

Year	Sites(a)	Site occupancy rate	Guest arrivals	Takings (b)
	No.	per cent	'000	\$'000
1984-85	19,392	33	971	16,520
1985-86	19,866	34	1,019	18,119
1986-87 (c)	23,576	37	1,083	24,100

(a) At 30 June. (b) Takings only from accommodation. (c) Up to 30 June 1986, includes caravan parks providing predominantly short term accommodation. From 1 July 1986 includes both short term and long term caravan parks.

CONSUMER AFFAIRS

The Department of Consumer Affairs was formed in April 1983 and has as its corporate mission the promotion and maintenance of fair trading in the market place. Functions of the Department are to promote the interests of consumers, to assist them in their assessment and use of goods and to regulate through licensing boards the operations of a number of consumer orientated trades and occupations.

During 1986-87 the Department was restructured to reflect its changing role, particularly as a result of legislative initiatives, and now comprises two Divisions; a Consumer Services Division and a Commercial Services Division.

The Consumer Services Division is responsible for the consumer advice and consumer assistance programs, consumer education and product safety programs, and research into areas of consumer interest; the Commercial Services Division is responsible for the occupational licensing program which features administrative support for the Commercial Tribunal, Occupational Licensing Boards and the Weights and Measures Branch.

In February 1987 the Government's Price Monitoring Unit was established to monitor grocery prices in metropolitan and country supermarkets (Price Check Campaign), investigate consumer price complaints and provide advice and information to consumers with respect to prices.

As part of its activities the Department provides specialised legal advice on a wide range of consumer related legal issues involved in the handling of complaints, investigates offences and, where necessary, initiates prosecution. There were 262 prosecutions successfully initiated during 1986-87.

TABLE 17.7 - DEPARTMENT OF CONSUMER AFFAIRS: COMPLAINTS FINALISED, 1984-85 TO 1986-87
(Source: Department of Consumer Affairs)

	1984-85		1985-86		1986-87	
	No.	Per cent	No.	Per cent	No.	Per cent
<i>Results of complaint investigation</i>						
Outcome assessed as having provided full measure of redress to consumer	1,406	29.9	1,777	32.7	1,743	30.4
Some adjustment secured as distinct from full redress	82	1.7	173	3.2	159	2.8
Situation clarified between consumer and trader	1,073	22.8	1,497	27.6	1,215	21.2
Incapable of resolution due to conflict of evidence	452	9.6	282	5.2	174	3.0
Proceedings initiated under Federal or State law	20	0.4	40	0.7	22	0.4
Outside Department's jurisdiction—						
Complaint referred to other departments and statutory bodies (including Parliamentary Commissioner).	244	5.2	258	4.7	330	5.7
Complaint withdrawn or lapsed	519	11.0	480	8.8	622	10.8
Complaint not justified	220	4.7	201	3.7	155	2.7
No redress — trader warned	107	2.3	90	1.7	27	0.5
Complaint referred to Small Claims Tribunal	473	10.1	519	9.6	646	11.2
Complaint lodged for information purposes only	106	2.3	116	2.1	189	3.3
Trader in liquidation or unable to be contacted (a)	n.a.	n.a.	n.a.	n.a.	458	8.0
Total	4,702	100.0	5,433	100.0	5,740	100.0

(a) New category.

**TABLE 17.8 - DEPARTMENT OF CONSUMER AFFAIRS
SUMMARY OF PRODUCT COMPLAINTS RECEIVED
1984-85 TO 1986-87**
(Source: Department of Consumer Affairs)

Product classification	Number of product complaints		
	1984-85	1985-86	1986-87
Food, beverages, tobacco	64	99	270
Clothing, footwear, drapery	139	149	211
Consumer durables	857	875	795
Motor vehicles and transport equipment	1,410	1,568	1,291
Building and construction	864	942	861
Miscellaneous products	439	713	444
Transport and energy services	179	195	238
Insurance and finance	287	409	532
Real estate and accommodation	117	177	204
Miscellaneous services	628	776	687
Total	4,984	5,903	5,533

REFERENCES

ABS publications:

Retail Industry: Summary of Operations, Australia, 1985-86, Preliminary (8613.0)

Tourist Accommodation, Western Australia (quarterly) (8635.5)

Other publications:

Western Australian Tourism Commission, *Domestic Travel in Western Australia, July 1986 - June 1987*

Western Australian Tourism Commission, *Western Australian Regional Tourism Research Monitor, July 1986 - June 1987.*

Chapter 18

HOUSING AND CONSTRUCTION

The typical dwelling in Western Australia is single, detached, of double brick construction, on its own block of land. It has three bedrooms and is owned or being purchased by the occupier. Information from the 1986 Census of Population and Housing indicates that throughout the State 80.1 per cent of the 456,515 private households lived in single detached houses. Only 7,016 (1.5 per cent) private households occupied multi-storey high rise flats (3 or more storeys). The remainder were accommodated in duplexes, row or terrace houses or similar medium density housing.

HOUSING AND THE CENSUS

The definitions below relate to data derived from the Census of Population and Housing.

Occupied Dwellings. For the purpose of the census an occupied dwelling is any habitation occupied on census night by a household group living together as a domestic unit, and may comprise the whole of a building or only part of it. This means the total number of occupied dwellings, as measured by the census, may be greater than the known number of structures.

Unoccupied Private Dwellings. An unoccupied private dwelling is defined as a structure built specifically for private living purposes and capable of being lived in, though unoccupied at the time of the census.

Private Dwellings comprise houses, including self-contained flats, and other dwellings such as sheds, tents, garages, caravans, houseboats, etc., occupied on a permanent or semi-permanent basis.

Non-Private Dwellings are dwellings which provide communal eating facilities including hospitals, homes for the aged, motels, hotels, boarding houses, gaols, religious and charitable institutions, defence establishments etc.

Table 18.1 gives particulars of the numbers of dwellings at the censuses of 1981 and 1986, together with the total number of persons enumerated.

Between the censuses of 1981 and 1986, the number of private occupied dwellings in the State increased by 13.1 per cent. The number of persons enumerated in private

dwellings showed an increase of 9.7 per cent.

TABLE 18.1 - DWELLINGS AND PERSONS
ENUMERATED
CENSUSES, 1981 AND 1986
(^{'000})

	1981	1986
DWELLINGS		
Occupied dwellings—		
Private (a)	403.6	456.5
Non-private	2.4	2.2
Caravans, etc. in parks (b)	n.a.	10.7
Total occupied dwellings (b)	406.0	469.5
Unoccupied private dwellings	42.1	53.9
PERSONS		
Persons enumerated in—		
Private dwellings	1,205.8	1,322.6
Caravans, etc. in parks (b)	n.a.	26.4
Other structures	67.8	58.0
Total persons	1,273.6	1,406.9

(a) Excludes caravans in caravan parks. (b) In 1981, caravan parks were treated as non-private dwellings. The number of caravans in caravan parks was not recorded and the figures for total occupied dwellings in 1981 and 1986 are not comparable.

CONTROL OF BUILDING

Each of the local government authorities as constituted under the provisions of the *Local Government Act 1960* has power to exercise general control over the erection of buildings in its own district. The powers of local government authorities to control building derive from the Town Planning and Development Act and the Local Government Act.

A more detailed description of these Acts appears on page 374 of the *Western Australian Year Book No. 24 - 1986*.

BUILDING STATISTICS

Scope

The statistics in this section relate to the erection of new buildings and alterations and additions valued at \$10,000 or more to existing buildings, until 1985-86 when non-residential statistics represent only those jobs valued at \$30,000 or more. Non-building construction of railways, roads, bridges, earthworks, etc. is excluded. Also excluded are particulars of repairs and maintenance to buildings.

Source of data

Data relating to the building approvals, dwelling unit commencements and building activity series are based on permits issued by local government authorities together with contracts let or day labour work authorised by Commonwealth, State, semi-government and local government authorities. Major building activity which takes place in areas not subject to the normal administrative approval processes (e.g. buildings on remote mine sites) is also included.

Definitions

Ownership. The ownership of a building is classified as either 'public sector' or 'private sector' according to the sector of the intended owner of the completed building as evident at the time of approval.

Residential buildings. A residential building is defined as a building predominantly consisting of one or more dwelling units. Residential buildings can be either 'houses' (a detached building predominantly used for long term residential purposes and consisting of only one dwelling unit), or 'other residential buildings'.

Non-residential building. Relates to construction work on buildings other than residential buildings. Additions and alterations to 'non-residential building' are also included.

Commenced. A building job is regarded as commenced when the first physical building activity has been performed on site.

Completed. A building job is regarded as completed when building activity has progressed to the stage where the building can fulfil its intended function.

Value of building completed. Represents the actual completion value based on the market or contract price of building jobs.

Value of building work done. Represents the estimated value of building work actually carried out during the period on building jobs which have commenced.

Building approvals

Tables 18.2 and 18.3 show details of building approved in Western Australia for the years 1984-85 to 1986-87.

TABLE 18.2 - NEW RESIDENTIAL BUILDING
APPROVED BY SECTOR
(Number of dwelling units)

Class of building	1984-85	1985-86	1986-87
PRIVATE SECTOR			
Houses	13,916	13,195	12,885
Other residential buildings	3,650	3,667	3,066
Total	17,566	16,862	15,951
PUBLIC SECTOR			
Houses	940	1,091	484
Other residential buildings	773	606	510
Total	1,713	1,697	994
ALL SECTORS			
Houses	14,856	14,286	13,369
Other residential buildings	4,423	4,273	3,576
Total	19,279	18,559	16,945

TABLE 18.3 - VALUE OF BUILDING APPROVED
BY SECTOR
(\$'000)

Class of building	1984-85	1985-86	1986-87
PRIVATE SECTOR			
New residential building—			
Houses	587,218	661,698	669,932
Other	123,596	127,745	116,942
Total	710,814	784,443	786,874
Alterations and additions (a) to residential buildings	53,268	67,221	72,149
Non-residential building	607,890	453,626	495,004
All building	1,371,971	1,310,290	1,354,027
PUBLIC SECTOR			
New residential building—			
Houses	39,979	57,164	31,719
Other	25,539	24,370	21,929
Total	65,518	81,534	53,648
Alterations and additions (a) to residential buildings	162	502	2,001
Non-residential building	211,594	256,784	241,599
All building	277,274	338,820	297,247

**TABLE 18.3 - VALUE OF BUILDING APPROVED
BY SECTOR—continued**
(\$'000)

<i>Class of building</i>	<i>1984-85</i>	<i>1985-86</i>	<i>1986-87</i>
ALL SECTORS			
New residential building—			
Houses	627,197	718,861	701,650
Other	149,134	152,116	138,871
Total	776,332	870,977	840,522
Alterations and additions (a) to residential buildings	53,429	67,723	74,150
Non-residential building	819,484	710,411	736,602
All building	1,649,245	1,649,110	1,651,274

(a) Valued at \$10,000 and over.

Approval of new residential buildings decreased by 8.7 per cent from 18,559 dwelling units in 1985-86 to 16,945 dwelling units in 1986-87. The value of new residential buildings approved in 1986-87 was \$841 million, a decrease of 3.5 per cent over 1985-86. Non-residential building approved showed a slight increase (3.8 per cent) from \$710 million in 1985-86 to \$737 million in 1986-87.

Building Activity Survey

Tables 18.4 to 18.6 show, for each class of building, the value of building work commenced and completed, together with the value of building work done, for the three years ended 1986-87.

The value of new residential building commenced in 1986-87 was \$792 million, a decrease of 5.2 per cent over 1985-86. This represented a decrease of 1,760 new dwelling units, from 17,340 in 1985-86 to 15,580 in 1986-87. The house component decreased by 930 to 12,190 and other residential buildings decreased by 829 to 3,390.

The value of building work done in Western Australia in 1986-87 was \$1,698 million at current prices. This represented 9.6 per cent of all building work done in Australia (\$17,755 million). Private sector projects accounted for 81.3 per cent of work done in Western Australia. The value of work done on new residential buildings increased by 0.6 per cent to \$807 million; work done on alterations and additions to residential buildings increased by 13.1 per cent to \$73 million; and construction of non-residential buildings decreased by 1.9 per cent to \$818 million.

**TABLE 18.4 - BUILDING COMMENCED
BY CLASS OF BUILDING**
(\$ million)

<i>Class of building</i>	<i>1984-85</i>	<i>1985-86</i>	<i>1986-87</i>
New residential building—			
Houses	617.8	673.6	657.7
Other	132.4	162.5	134.5
Total new residential building	750.1	836.1	792.3
Alterations and additions (a) to residential buildings	52.9	66.7	72.3
Non-residential building (b)—			
Hotels, etc.	110.5	47.0	25.7
Shops	41.1	108.7	152.7
Factories	24.6	46.6	47.6
Offices	215.4	197.4	119.5
Other business premises	79.0	77.2	80.8
Educational	88.1	82.0	100.3
Religious	3.8	4.1	6.3
Health	102.5	53.0	34.8
Entertainment and recreational	93.6	40.7	44.1
Miscellaneous	32.2	63.0	42.2
Total non-residential building	790.6	719.8	654.1
Total all building	1,593.6	1,622.6	1,518.7

(a) Valued at \$10,000 and over. (b) Valued at \$10,000 and over until June quarter 1985. From September quarter 1985 valued at \$30,000 and over.

**TABLE 18.5 - BUILDING COMPLETED
BY CLASS OF BUILDING**
(\$ million)

<i>Class of building</i>	<i>1984-85</i>	<i>1985-86</i>	<i>1986-87</i>
New residential building—			
Houses	r583.9	615.7	651.5
Other	115.3	158.1	144.3
Total new residential building	r699.2	773.9	795.8
Alterations and additions (a) to residential buildings	51.9	60.5	70.4
Non-residential building (b)—			
Hotels, etc.	38.4	40.1	116.3
Shops	53.6	46.3	124.0
Factories	27.9	91.5	39.0
Offices	55.6	149.9	155.8
Other business premises	68.9	61.0	100.9
Educational	30.7	65.3	99.2
Religious	3.0	4.1	5.1
Health	24.3	27.8	80.8
Entertainment and recreational	19.3	98.2	18.0
Miscellaneous	35.9	46.5	55.8
Total non-residential building	357.5	630.8	794.9
Total all building	r1,108.6	1,465.1	1,661.1

(a) Valued at \$10,000 and over. (b) Valued at \$10,000 and over until June quarter 1985. From September quarter 1985 valued at \$30,000 and over.

TABLE 18.6 - BUILDING WORK DONE
BY CLASS OF BUILDING
(\$ million)

Class of building	1984-85	1985-86	1986-87
New residential building—			
Houses	r601.5	643.5	668.0
Other	124.5	158.9	139.4
Total new residential building	r726.0	802.4	807.4
Alterations and additions (a) to residential buildings	52.7	64.8	73.3
Non-residential building (b)—			
Hotels, etc.	r41.3	110.6	84.8
Shops	44.7	83.1	133.3
Factories	33.5	44.9	47.0
Offices	r126.0	194.7	185.8
Other business premises	r57.9	88.4	83.3
Educational	52.9	95.5	100.8
Religious	3.0	4.3	5.7
Health	37.5	67.7	79.1
Entertainment and recreational	28.8	96.4	39.7
Miscellaneous	r41.4	47.5	58.4
Total non-residential building	r467.0	833.2	817.8
Total all building	r1,245.7	1,700.4	1,698.5

(a) Valued at \$10,000 and over. (b) Valued at \$10,000 and over until June quarter 1985. From September quarter 1985 valued at \$30,000 and over.

Table 18.7 shows the number of houses and other residential buildings commenced, classified by ownership in Western Australia for the years 1984-85 to 1986-87.

More detailed statistics relating to building are published quarterly in the bulletin *Building Activity, Western Australia* (Catalogue No. 8752.5).

TABLE 18.7 - HOUSES AND OTHER RESIDENTIAL
BUILDINGS COMMENCED
CLASSIFIED BY OWNERSHIP

	1984-85	1985-86	1986-87
Private sector—			
Houses (a)	13,420	12,060	11,680
Other residential buildings (b)	3,260	3,592	2,856
Public sector—			
Houses	895	1,067	503
Other residential buildings (b)	751	627	534
All sectors			
Houses (a)	14,320	13,120	12,180
Other residential buildings (b)	4,011	4,219	3,390

(a) Figures are rounded to nearest ten units. (b) Number of dwelling units.

Dwelling Unit Commencement series

A consequence of the sampling techniques used for private sector house building in the Building Activity Survey is that estimates for this class of building cannot be produced at finer levels of geographic disaggregation than State/Territory levels without incurring unacceptably high sampling errors.

To compensate for this loss of detail, a monthly Dwelling Unit Commencement series was implemented in July 1980. The data are compiled from monthly returns supplied by local and other government authorities.

TABLE 18.8 - DWELLING UNITS COMMENCED IN STATISTICAL DIVISIONS BY OWNERSHIP : 1986-87

Statistical division	Private sector			Public sector			Total		
	Houses	Other residential buildings	Total	Houses	Other residential buildings	Total	Houses	Other residential buildings	Total
Perth Statistical Division	9,131	2,323	11,454	149	305	454	9,280	2,628	11,908
Other divisions—									
South-West	1,154	110	1,264	60	84	144	1,214	194	1,408
Lower Great Southern	222	17	239	13	8	21	235	25	260
Upper Great Southern	68	-	68	8	2	10	76	2	78
Midlands	277	12	289	23	10	33	300	22	322
South-Eastern	143	42	185	27	32	59	170	74	244
Central	246	51	297	68	15	83	314	66	380
Pilbara	305	84	389	145	40	185	450	124	574
Kimberley	125	10	135	41	26	67	166	36	202
Total	2,540	326	2,866	385	217	602	2,925	543	3,468
Total Western Australia	11,671	2,649	14,320	534	522	1,056	12,205	3,171	15,376

However, because this methodology is different from that of the Building Activity Survey, total figures for Western Australia

differ between the two series by a small margin.

Table 18.8 shows the number of new dwelling units commenced in each statistical division during 1986-87.

Table 18.9 shows the number of new houses, classified by material of outer walls, commenced in Western Australia for the years 1984-85 to 1986-87.

TABLE 18.9 - HOUSES COMMENCED, BY MATERIAL OF OUTER WALLS

Type of material	1984-85	1985-86	1986-87
Double brick (a)	11,936	11,393	10,548
Brick veneer	871	1,055	806
Fibre cement	579	579	575
Other	284	260	276
Total new houses	13,670	13,287	12,205

(a) Includes houses built with outer walls of stone or concrete.

For more detailed monthly dwelling unit commencement statistics see the publication, *Dwelling Unit Commencements Reported by Approving Authorities* (Catalogue No. 8741.5).

CONSTRUCTION (OTHER THAN BUILDING) OPERATIONS

This series covers non-building construction such as roadworks, railways, bridges and earthworks. It comprises work by private contractors on construction (other than building) prime contracts (including alterations and additions) valued at \$100,000 or more at commencement of the contract. Construction undertaken by government authorities involving day labour, and own account construction by private sector enterprises are excluded.

TABLE 18.10 - CONSTRUCTION (OTHER THAN BUILDING) PRIME CONTRACTS BY STAGE OF CONSTRUCTION

Stage of construction	1983-84	1984-85	1985-86
Commenced—			
Number	306	388	365
Value (\$m)	269	476	583
Completed—			
Number	291	r418	375
Value (\$m)	481	1,258	458
Under construction (a)—			
Number	174	r144	134
Value (\$m)	1,301	546	745
Work done during period (\$m)	738	596	534
Work yet to be done (a) (\$m)	309	r234	355

(a) At end of period.

Prime contracts are those where the contractor is legally liable to the owner of the project. Table 18.10 shows the number and value of such contracts classified by stage of construction.

This series has now been replaced by the Engineering Construction Survey.

ENGINEERING CONSTRUCTION SURVEY

The collection, scope and methodology used for this survey differs from the 'Construction (Other than Building)', survey it replaces. This survey aims to measure all engineering construction work undertaken whereas the survey it replaces only measured work undertaken by the private sector. For more details of differences see *Engineering Construction Survey, Australia June quarter 1987* (Catalogue No. 8762.0).

TABLE 18.11 - ENGINEERING CONSTRUCTION ACTIVITY BY STAGE OF CONSTRUCTION (\$ million)

Stage of construction	1986-87
Commenced during period	1,185
Work done during period	1,378
Work yet to be done	681

CONSTRUCTION INDUSTRY STATISTICS

In 1978-79 the Australian Bureau of Statistics conducted a sample survey of private sector construction establishments, and a complete enumeration of public sector enterprises engaged in significant construction activity. This survey was repeated in 1985 for the 1984-85 year.

The survey forms part of the system of integrated economic censuses. Details of the 1978-79 survey, and tables of results appear on pages 338-40 of the *Western Australian Year Book* No. 21—1983.

Construction Industry Survey (Private Sector)

Statistics in this section were compiled from a sample survey of private sector construction establishments in respect of the year 1984-85. The survey is part of the system of integrated economic censuses.

Table 18.12 contains a summary of the principal private sector construction statistics by industry class for 1984-85. Table

18.13 shows the value of construction work done by type of construction and type of project for private sector construction establishments 1984-85.

TABLE 18.12 - PRIVATE SECTOR CONSTRUCTION ESTABLISHMENTS
SUMMARY OF OPERATIONS BY INDUSTRY CLASS : 1984-85

Industry class	Number of establishments operating at 30 June	Average employment over whole year	Wages and salaries	Turnover	Value added
		Persons	\$'000	\$'000	\$'000
General construction establishments—					
Building construction—					
House construction	1,671	3,937	28,963	578,065	98,630
Residential building construction n.e.c.	79	208	2,521	45,253	6,832
Non-residential building construction	273	2,544	49,241	491,849	117,967
Total	2,023	6,689	80,725	1,115,168	223,428
Non-building construction—					
Road and bridge construction	117	1,181	24,538	173,626	59,901
Non-building construction n.e.c.	278	2,361	55,636	260,583	114,709
Total	396	3,542	80,175	434,208	174,610
Total general construction establishments	2,419	10,231	160,900	1,549,376	398,038
Special trade construction establishments—					
Concreting	372	1,187	10,437	70,180	25,305
Bricklaying	1,420	2,669	8,286	58,772	38,205
Roof tiling	115	349	1,763	15,753	6,736
Floor and wall tiling	385	623	794	11,375	7,008
Structural steel erection	149	435	6,562	21,639	11,474
Plumbing	845	2,235	17,717	107,645	42,885
Electrical work	992	3,443	47,415	176,231	83,764
Heating and airconditioning	71	628	10,520	59,214	17,628
Plastering and plaster fixing	627	1,361	7,193	52,247	22,935
Carpentry	1,147	1,931	6,897	47,433	27,559
Painting	934	2,168	17,283	79,163	45,287
Earthmoving and dredging	386	1,888	27,784	137,689	58,838
Special trades n.e.c.	558	1,835	20,070	105,942	42,975
Total special trade construction establishments	8,001	20,754	182,721	943,282	430,600
TOTAL CONSTRUCTION ESTABLISHMENTS	10,420	30,985	343,621	2,492,658	828,638

TABLE 18.13 - PRIVATE SECTOR CONSTRUCTION ESTABLISHMENTS
VALUE OF CONSTRUCTION WORK DONE
BY TYPE OF CONSTRUCTION BY TYPE OF PROJECT : 1984-85
(\$'000)

	Trade contracting		General construction		
	Prime contract	Sub-contract	Prime contract	Sub-contract	Speculative construction
Building construction					
Houses—					
New	6,812	199,849	436,906	5,027	12,652
Alterations, additions and improvements	44,278	32,845	69,063	2,749	-
Other residential buildings—					
New	432	32,302	59,719	(a)694	14,515
Alterations, additions and improvements	3,523	7,385	1,628	4	-
Total residential building	55,046	272,382	567,316	8,474	27,167
Non-residential building—					
New work, alterations, additions and improvements	55,325	251,761	420,983	n.p.	n.p.
Total non-residential building	55,325	251,761	420,983	n.p.	n.p.
Total building construction	110,371	524,114	988,298	n.p.	n.p.

TABLE 18.13 - PRIVATE SECTOR CONSTRUCTION ESTABLISHMENTS
VALUE OF CONSTRUCTION WORK DONE
BY TYPE OF CONSTRUCTION BY TYPE OF PROJECT : 1984-85—continued
(\$'000)

	<i>Trade contracting</i>		<i>General construction</i>		
	<i>Prime contract</i>	<i>Sub-contract</i>	<i>Prime contract</i>	<i>Sub-contract</i>	<i>Speculative construction</i>
Engineering construction—					
New work, alterations and additions to—					
Roads, highways and related structures	22,929	19,461	119,707	n.p.	n.p.
Bridges	n.p.	n.p.	14,561	-	-
Railways and tramways	n.p.	352	n.p.	-	-
Harbours	n.p.	n.p.	n.p.	-	-
Dams, water supply pipelines	7,347	2,402	12,532	-	-
Electric power transmission lines	n.p.	n.p.	7,877	-	-
Electric power distribution lines	n.p.	1,267	n.p.	-	-
Water distribution systems	6,177	(a)1,104	(a)8,478	15	-
Sewer systems	5,343	1,916	9,434	900	-
Pipelines n.e.c.	(a)2,128	5,550	29,524	13,473	-
Heavy electrical generating plant and equipment	n.p.	9,973	n.p.	-	-
Heavy industrial plant and equipment n.e.c.	35,543	19,263	50,591	3,353	-
Telecommunications towers, lines and structures	(a)393	98	913	1,474	-
Other	34,496	9,095	61,582	n.p.	-
Total engineering construction	116,518	74,205	348,782	43,267	n.p.
Repair, maintenance and demolition	75,849	15,802	59,973	n.p.	-
TOTAL CONSTRUCTION	302,739	614,150	1,397,053	91,936	35,588

(a) Included for completeness, high standard error.

Chapter 19

TRANSPORT AND COMMUNICATION

Transport

Western Australia's main transport systems are based generally on Perth, the capital, and on Fremantle, the principal port. Subsidiary systems are centred on a number of outports north and south of Fremantle and on some inland towns. International flights operate through the airports at Perth and the north-west town of Port Hedland.

ROAD TRANSPORT

Roads

The Main Roads Department is the principal road authority in Western Australia. In conjunction with local government authorities it is responsible for the planning, design, construction and maintenance of the State road network.



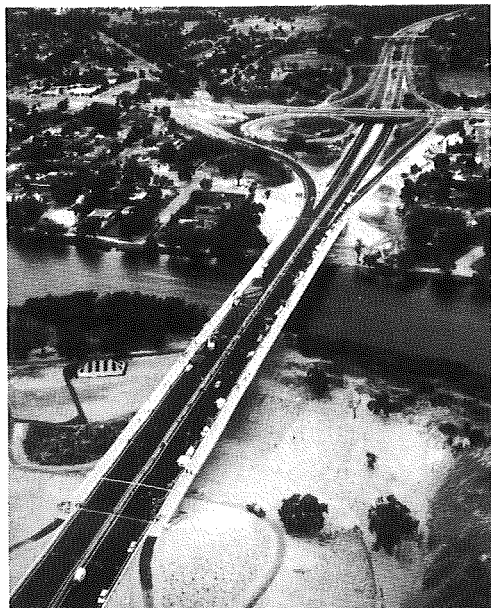
The William Street Bridge, listed by the Australian Heritage Commission as an historical monument, has been restored.

Photograph: Main Roads Department

TABLE 19.1 - ROUTE DISTANCES BETWEEN MAJOR TOWNS IN WESTERN AUSTRALIA (a)
(Source: Main Roads Department)
(kilometres)

	Perth	Albany	Broome	Bunbury	Carnarvon	Esperance	Geraldton	Kalgoorlie	Kununurra	Manjimup	Newman	Port Hedland
Perth	-	409	2,232	176	902	721	424	596	3,209	300	1,184	1,641
Albany	409	-	2,977	337	(b)1,311	482	(b)833	797	3,954	208	1,929	2,386
Broome	2,232	2,977	-	(b)2,408	1,458	2,578	1,926	2,180	1,045	(b)2,532	1,052	611
Bunbury	176	337	(b)2,408	-	(b)1,078	757	(b)600	782	(b)3,385	124	(b)1,360	(b)1,817
Carnarvon	902	(b)1,311	1,458	(b)1,078	-	(b)1,623	480	1,462	2,472	(b)1,202	988	872
Esperance	721	482	2,578	757	(b)1,623	-	(b)1,145	398	255	690	1,530	1,987
Geraldton	424	(b)833	1,926	(b)600	480	(b)1,145	-	984	2,908	(b)724	952	1,340
Kalgoorlie	596	797	2,180	782	1,462	398	984	-	3,157	808	1,132	1,169
Kununurra	3,209	3,954	1,045	(b)3,385	2,472	355	2,908	3,157	-	(b)3,509	2,029	1,588
Manjimup	300	208	(b)2,532	124	(b)1,202	690	(b)724	808	(b)3,509	-	(b)1,484	(b)1,941
Newman	1,184	1,929	1,052	(b)1,360	988	1,530	952	1,132	2,029	(b)1,484	-	464
Port Hedland	1,641	2,386	611	(b)1,817	872	1,987	1,340	1,169	1,588	(b)1,941	464	-

(a) Via the shortest practical declared route. (b) Via Perth.



The Redcliffe Bridge, opened on 16 April 1988, carries the Tonkin Highway over the Swan River.

Photograph: Main Roads Department.

The basis of the Western Australian road system is a series of declared highways and main roads which are the responsibility of the Department. These highways and roads carry traffic to major internal centres and interstate. Other connecting or local roads, declared as secondary or unclassified are controlled by individual local councils.

Road statistics at 30 June 1987 were:

Highways	7,936 km
Main Roads	7,460 km
Secondary Roads	8,645 km
Unclassified Roads	116,625 km

State sealed road length totalled 40,440 kilometres.

Table 19.1 shows the route distance between major towns in Western Australia.

A comprehensive route numbering system for roads was established in Western Australia during 1986. The new system consists of 43 State Routes in the metropolitan area and 15 in the country. In the metropolitan area the route marking system was operational by August 1986.

For further information on roads, including road finance, refer to the *Western Australian Year Book* No. 24—1986.

Motor vehicles

The Traffic Board of Western Australia is responsible for the registration and licensing of vehicles, the licensing of motor vehicle drivers, the analysis of road traffic accident statistics, and research into the causes and prevention of road traffic accidents.

TABLE 19.2 - MOTOR VEHICLE REGISTRATIONS

	1985	1986	1987
New motor vehicle registrations—			
Year ended 30 June—			
Motor cars and station wagons	46,070	42,645	33,642
Utilities and panel vans	11,825	8,274	5,758
Trucks and buses	6,131	5,402	4,440
Motor cycles	4,310	3,350	2,305
Total	68,336	59,671	46,145
Vehicles on register—			
At 30 June—			
Motor cars and station wagons	615,442	632,182	647,734
Utilities and panel vans	130,500	132,350	133,588
Trucks and buses	84,149	86,501	89,442
Motor cycles	36,229	36,324	35,287
Total	866,320	887,357	906,051

TABLE 19.3 - CURRENT DRIVERS' LICENCES
(Source: Traffic Board of Western Australia)

Age group	At 30 June 1986		Total
	Male	Female	
Under 17	304	44	348
17 - 20	37,641	32,458	70,099
21 - 24	43,738	41,289	85,027
25 - 29	57,166	54,902	112,068
30 - 39	114,171	106,186	220,357
40 - 49	82,151	69,205	151,320
50 - 59	59,737	43,542	103,279
60 and over	65,730	37,907	103,637
Total	460,602	385,533	846,135

TABLE 19.4 - DRIVERS' LICENCES
DISQUALIFICATIONS AND CANCELLATIONS: 1986
(Source: Traffic Board of Western Australia)

Nature of offence	Number
Alcohol related—	
Driving under the influence	6,639
Driving with 0.08% or more	6,455
Refusing test	502
Other	329
Dangerous, reckless or careless driving	1,947
Speeding	725
Driving under disqualification	2,475
Driving without a licence	1,743
Demerit points suspension	3,125
Other	2,550
Total	26,490

A survey of motor vehicle usage is undertaken by the Australian Bureau of Statistics every three years, the latest survey relating to the twelve months ended 30 September 1985. The survey is based on a sample of

approximately 60,000 vehicles across Australia (7,000 vehicles in Western Australia), of which 80 per cent were trucks and other commercial vehicle types.

TABLE 19.5 - ANNUAL KILOMETRES TRAVELLED (a)
YEAR ENDED 30 SEPTEMBER 1985

Vehicle type	Perth Statistical Division	Area of travel		Total
		Rest of State	Interstate	
Cars and station wagons	6,996.1	3,194.4	108.6	10,299.1
Utilities and panel vans	1,167.5	1,061.6	31.7	2,260.9
Rigid trucks	366.9	548.1	10.2	925.3
Articulated trucks	61.4	224.4	40.5	326.3
Other truck types	16.2	14.0	-	30.2
Motor cycles	138.5	72.7	6.2	217.4
Total	8,746.7	5,115.2	197.3	14,059.2

(a) Vehicles registered in Western Australia.

TABLE 19.6 - FUEL CONSUMPTION AND TONNES CARRIED (a)
YEAR ENDED 30 SEPTEMBER 1985

Vehicle type	Fuel consumption (million litres)				Tonnes carried (⁰⁰⁰)
	Petrol	Diesel	Other (b)	Total	
Cars and station wagons	1,181.8	31.0	17.2	1,230.0	-
Utilities and panel vans	262.9	44.6	0.8	308.3	6,188
Rigid trucks	86.0	136.6	3.4	225.9	71,006
Articulated trucks	0.7	172.8	-	173.6	46,913
Other truck types	4.1	4.4	-	8.5	-
Motor cycles	12.3	-	-	12.3	-
Total	1,547.7	389.4	21.5	1,958.6	124,107

(a) Vehicles registered in Western Australia. (b) Including LPG and dual fuelled.

Detailed information appears in the publication *Survey of Motor Vehicle Usage, Twelve months ended 30 September 1985* (Catalogue No. 9208.0).

In the Perth Metropolitan and Mandurah regions a number of cycle paths have been developed to cater for the growing number of pedal cyclists. The Minister for Local Government and his department are responsible for administering matters relating to pedal cycling on roads and cycle paths. A State Bicycle Committee is responsible for co-ordinating the various inputs to bicycle policy. A Perth Metropolitan Region Bikeplan (May 1985), a Bunbury Bikeplan (September 1986) and a Mandurah Bikeplan (January 1986) were released for public comment. A Bicycle Management Team (known as 'Bike West') within the Department of Local Government is responsible to the Committee for the development and

implementation of the Bikeplans with assistance from local groups.

Bus and ferry services

The Metropolitan (Perth) Passenger Transport Trust (MTT) bears overall responsibility for all of Perth's metropolitan public transport (bus, ferry and train services). The metropolitan area is designated as being within a 50 kilometre radius of the Perth Town Hall as well as the area west of the South-West Highway between Perth and Pinjarra. The ferry service operates on the Swan River between Perth and South Perth. Buses and ferries are also available for charter from Transperth, the new trading name for the MTT.

Details of the operations of Transperth are given in Table 19.7.

For information about metropolitan rail services refer to the section 'Rail Services'.

A growing number of privately owned ferry companies operate tours to the wine growing regions of the Swan River as well as river and harbour cruises around Perth and Fremantle, and trips to Rottnest Island.

Road transport of passengers outside the metropolitan area is provided by both the railway road services (see the section 'Rail Services') and privately operated bus services. The railway coach services operate in the southern part of the State, and the privately operated bus services cater predominantly for those areas north of Geraldton.

Intratown bus services are provided in a number of the larger country towns by private operators, although in the Kalgoorlie - Boulder region services are undertaken by the Eastern Goldfields Transport Board.

In certain country areas private operators, under Government contract, run school bus services taking country children to and from school.

TABLE 19.7 - TRANSPERTH BUS AND FERRY SERVICES (a)

(Source: Metropolitan (Perth) Passenger Transport Trust)

	1983-84	1984-85	1985-86
Buses—			
Number (b)	912	882	878
Route kilometres	1,647	1,691	1,723
Bus kilometres ('000)	42,964	42,898	44,725
Passenger journeys ('000)	49,627	48,194	50,406
Ferries—			
Number (b)	6	5	5
Route kilometres	3	3	3
Kilometres run ('000)	41	40	40
Passenger journeys ('000)	439	404	469

(a) Excludes private charter and tourist services but in the case of buses includes clipper and school specials.
(b) At 30 June.

Taxi services

The Taxi Control Board controls the operations of taxis in the Perth Metropolitan Traffic Area and any other designated areas.

During 1986 the number of taxis operating was reduced to a ratio of one to every 1,000 of population. Additional private taxis (luxury type vehicles used mainly for VIP work and tours where a chauffeur driven limousine is required) were licensed to cater for a growing demand for this type of vehicle. Private taxi numbers increased from

16 to 25 during the year. To cater for the America's Cup additional restricted taxi licences were issued and temporary taxi stands were provided in the Fremantle area. Taxi requirements at the new Perth International Terminal are still under investigation.

Road traffic accidents

Statistics of road traffic accidents are prepared from information concerning accidents in public thoroughfares, as supplied by the Western Australian Police Department. The statistics are confined to accidents which satisfied all of the following conditions: (a) the accident was reported to the police; (b) the accident occurred on a road, street etc. open to the public, including railway level crossing; (c) it involved a road vehicle or driven animal which at the time of the accident was in motion; (d) the accident resulted in the death of a person within 30 days after the accident or bodily injury to a person to an extent requiring surgical or medical treatment.

Tables 19.8 and 19.9 show, for the years 1984 to 1986, the number of fatalities and injuries which occurred in Western Australia, classified by type of road user and age group.

TABLE 19.8 - ROAD TRAFFIC ACCIDENTS CASUALTIES ACCORDING TO TYPE OF ROAD USER

Type of road user	1984	1985	1986
PERSONS KILLED			
Drivers of motor vehicles	78	85	85
Motor cyclists (a)	25	32	18
Pedal cyclists	10	4	14
Passengers—			
Motor vehicle	54	71	60
Motor cycle	3	3	2
Pedestrians	47	47	48
Other (b)	3	1	-
Total	220	243	227
PERSONS INJURED			
Drivers of motor vehicles	4,202	4,746	5,144
Motor cyclists (a)	792	923	824
Pedal cyclists	319	406	464
Passengers—			
Motor vehicle	2,561	2,975	2,880
Motor cycle	132	140	125
Pedestrians	519	552	540
Other (b)	171	129	208
Total	8,696	9,871	10,185

(a) Includes riders of motor scooters. (b) Includes passengers on pedal cycles, bystanders, train crews, riders of horses, drivers of animal-drawn vehicles and road user type not stated.

TABLE 19.9 - ROAD TRAFFIC ACCIDENTS
CASUALTIES CLASSIFIED BY AGE

Age group	1984	1985	1986
Persons killed—			
Under 5	8	7	8
5 - 9	8	9	9
10 - 16	11	11	15
17 - 20	40	42	33
21 - 24	27	37	27
25 - 29	27	27	31
30 - 39	27	30	24
40 - 49	22	28	20
50 - 59	19	8	17
60 and over	31	44	43
Not stated	-	-	-
Total	220	243	227
Persons injured—			
Under 5	167	201	180
5 - 9	258	249	272
10 - 16	746	836	784
17 - 20	1,700	1,929	2,039
21 - 24	1,214	1,481	1,402
25 - 29	994	1,091	1,163
30 - 39	1,245	1,436	1,578
40 - 49	774	860	966
50 - 59	503	533	593
60 and over	538	621	641
Not stated	557	634	567
Total	8,696	9,871	10,185

Road traffic accidents for 1985 and 1986 are classified in Table 19.10 by the nature of the accident and the feature of roadway.

For additional information on road traffic accidents in this State, refer to *Road Traffic Accidents Involving Casualties, Reported to the Police Department*, (Catalogue No. 9405.5) a publication which is issued quarterly and to the annual publication (Catalogue No. 9406.5).

TABLE 19.10 ROAD TRAFFIC ACCIDENTS

	Casualty accidents	Persons killed	Persons injured
1985			
Nature of accident —			
Multi-vehicle accident	4,985	95	6,601
Single vehicle accident—			
Struck object	1,063	70	1,361
Struck pedestrian	595	39	587
Overtaking	582	24	863
Falling (a)	196	6	207
Other	132	5	171
Unknown	61	4	81
Total	7,614	243	9,871
Feature of roadway —			
Intersection	3,700	57	4,810
Straight road	2,853	123	3,627
Curve or bend	872	57	1,204
Other	189	6	230
Total	7,614	243	9,871

TABLE 19.10 ROAD TRAFFIC ACCIDENTS—continued

	Casualty accidents	Persons killed	Persons injured
1986			
Nature of accident —			
Multi-vehicle accident	5,379	87	7,006
Single vehicle accident—			
Struck object	1,018	41	1,298
Struck pedestrian	576	45	560
Overtaking	594	43	854
Falling (a)	236	6	245
Other	93	1	114
Unknown	79	4	108
Total	7,975	227	10,185
Feature of roadway —			
Intersection	4,008	54	5,169
Straight road	2,880	104	3,564
Curve or bend	917	63	1,236
Other	170	6	216
Total	7,975	227	10,185

(a) Includes all motor cycle and pedal cycle accidents where the driver or passenger fell from the vehicle regardless of whether the vehicle overturned.

RAIL SERVICES

A railway system extends from Fremantle, Perth and Midland into the mining, agricultural and forestry areas in the southern half of the State. The railways in this part of the State are operated by the Western Australian Government Railways Commission (trading under the name Westrail). The system is linked with railways in other States at Kalgoorlie where it joins Australian National Railways. In addition to the Westrail service for general and passenger traffic there are private railways for the haulage of iron ore in the north of the State and timber and alumina in the south.

TABLE 19.11 - WESTRAIL SERVICES
(Source: Westrail)

	1984-85	1985-86	1986-87
Kilometres of railway (a)—			
Route kilometres	5,623	5,563	5,553
Track kilometres (b)	7,191	7,099	7,047
Kilometres run ('000)—			
Train	10,333	11,098	10,364
Road bus (c)	2,465	2,451	2,430
Passenger journeys ('000)—			
Rail	211	196	209
Road (c)	168	165	171
Tonnes carried ('000) (d)	19,870	22,085	20,877

(a) Excludes suburban rail. (b) Includes sidings. (c) In addition to its rail services, Westrail operates a system of road services for passengers and freight. (d) Paying goods only.

At 30 June 1986 there were 5,553 kilometres of railway owned and operated by Westrail, with a further 731 kilometres of rail owned by the Commonwealth Government and operated by Australian National Railways.

Suburban passenger rail operations are administered and operated by Westrail for Transperth, with Transperth being responsible for policy and finance.

TABLE 19.12 - SUBURBAN RAIL SERVICES
(Source: Metropolitan (Perth) Passenger Transport Trust)

	1983-84	1984-85	1985-86
Rail cars and carriages (No.)	88	98	94
Route kilometres	63	63	67
Train kilometres ('000)	2,385	2,394	2,348
Passenger journeys ('000)	8,754	9,307	9,742

The suburban rail network is scheduled to be fully electrified by 1992 with the first electric train running by early 1989.

The exploitation of extensive inland deposits of iron ore in Western Australia has necessitated the construction of private railways for the transport of ore from the mines to the coast. Conditions applying to the construction and operation of these railways are incorporated in agreements made between the State Government and mining companies. The private railways operate from Newman to Port Hedland (427 kilometres), Paraburdoo to Dampier (388 kilometres), Shay Gap to Port Hedland (180 kilometres) and Pannawonica to Cape Lambert (190 kilometres). The summary in Table 19.13 relates to railways used for the transport of iron ore for the years 1984-85 to 1986-87.

TABLE 19.13 - IRON ORE RAILWAYS

	1984-85	1985-86	1986-87
Kilometres	1,285	1,185	1,185
Locomotives in service	123	122	124
Ore wagons	5,497	5,516	5,514
Tonnes carried ('000)	86,434	82,723	88,037

A number of private organisations operate tourist railways in the south-west of the State principally on lines owned and maintained by Westrail. The tourist railways own the steam locomotives used on the tourist services.

AIR SERVICES

An extensive system of regular air services operates in Western Australia for the transport of passengers, freight and mail. Perth has frequent and direct links with major Western Australian regional centres, other Australian capital cities and Alice Springs. It also has direct overseas links which include Europe, Asia, Africa and New Zealand. Pacific and American connections are made via the Eastern States. Port Hedland, the second international airport in Western Australia, has direct international links with Bali.

The Federal Airports Corporation is responsible for the operations at Perth (and Jandakot) airports, including the new Perth International Terminal which is located twelve kilometres from the domestic terminal. The Terminal, which had been under construction since March 1983, became operational on 27 October 1986. A feature of the new Perth International Terminal is the control tower which is 70 metres high — the highest in Australia.

The domestic and international airports at Perth are currently used by:

- 10 international operators
- 3 interstate operators
- 2 intrastate operators
- 3 commuter operators connecting Perth with 17 country centres.

Other commuter services connect townships and stations with ports on jet routes.

TABLE 19.14 - PASSENGER TRAFFIC BETWEEN PERTH AND PRINCIPAL AIRPORTS (a)
(Source: Department of Aviation)

	Passengers		
	1984	1985	1986
Domestic —			
Adelaide	191,537	206,964	216,117
Alice Springs	30,546	33,119	34,746
Brisbane	5,851	8,571	6,798
Melbourne	301,730	334,791	353,244
Sydney	184,026	204,156	228,448
International —			
Auckland	38,006	43,893	p54,180
Denpasar	56,690	66,351	p71,499
Hong Kong	47,807	46,580	p61,912
Kuala Lumpur	37,133	47,972	p51,859
London	56,334	59,664	p65,127
Singapore (b)	149,110	163,682	p180,437

(a) Total of embarkations and disembarkations. (b) Figures for Singapore include connections with countries not directly linked with Perth and other services involving connections at Singapore.

TABLE 19.15 - PASSENGER AND AIRCRAFT MOVEMENTS AT PRINCIPAL AIRPORTS

Airport	Passengers (a)			Aircraft movements (b)		
	1984	1985	1986	1984	1985	1986
Broome	26,896	26,703	32,067	1,892	1,868	1,837
Carnarvon	15,887	17,911	17,212	1,114	1,182	1,060
Derby	34,618	35,622	35,309	2,561	2,569	2,164
Geraldton	25,750	26,273	27,943	1,586	1,544	1,501
Kalgoorlie	59,974	67,084	71,590	1,488	1,536	1,618
Karratha	109,752	119,106	136,497	4,370	6,101	5,294
Kununurra	35,727	44,177	34,081	1,721	1,944	1,698
Learmonth	9,908	11,671	10,532	870	1,050	816
Newman	20,043	25,668	28,439	1,786	1,915	1,371
Paraburdoo	25,256	26,537	27,213	1,763	1,808	1,380
Perth —						
Internal (c)	1,074,961	1,194,602	1,264,444	14,544	16,036	16,647
International	454,622	502,169	568,965	3,053	2,951	3,280
Port Hedland —						
Internal	68,288	89,189	93,980	3,888	3,412	4,804
International	3,209	4,090	4,161	104	136	104

(a) Total of embarkations and disembarkations. (b) Total of arrivals and departures. (c) Interstate and intrastate.

SHIPPING

Western Australia's sea-borne trade is conducted through the Port of Fremantle and a number of outports. Of these, Geraldton, Bunbury, Albany and Esperance are situated in the more highly developed south-western and southern parts of the State. The less closely settled areas of the north-west and the north are served by ports and other landing points at Useless Loop (Shark Bay), Carnarvon, Cape Cuvier, Exmouth, Barrow Island, Dampier, Port Walcott (Cape Lambert), Port Hedland, Broome, Derby, Yampi and Wyndham.

Table 19.16 shows the number of arrivals into and departures from each port by vessels coming direct from or going direct to

overseas ports for the period 1983-84 to 1985-86. The figures exclude particulars of naval vessels; yachts and other craft used for pleasure; foreign fishing vessels that neither load nor discharge cargo; geophysical and oceanographic research vessels; oil-drilling rigs and vessels servicing them; and vessels of 200 registered net tonnes and under.

The importance of mineral developments in the north-west of the State is evident from the numbers of ship calls in the ports of Dampier, Port Hedland and Port Walcott. They are surpassed only by the Port of Fremantle, the principal port of Western Australia.

TABLE 19.16 - OVERSEAS SHIP CALLS (a) AT MAJOR PORTS

Port	Arrivals			Departures		
	1983-84	1984-85	1985-86	1983-84	1984-85	1985-86
Fremantle	1,015	1,018	988	1,006	1,016	976
Other ports—						
Bunbury	152	195	184	149	196	188
Cape Cuvier	9	13	7	10	13	7
Dampier	470	506	462	470	504	463
Geraldton	181	187	160	178	186	164
Port Hedland	391	448	449	380	424	434
Port Walcott	132	109	96	137	106	100
Yampi Sound	35	15	25	34	15	26
Other	236	300	229	235	302	226
Total	1,606	1,773	1,612	1,593	1,746	1,608
All ports	2,621	2,791	2,600	2,599	2,762	2,584

(a) Number of port visits made by ships engaged in overseas voyages.

TABLE 19.17 - OVERSEAS CARGO LOADED AND DISCHARGED AT MAJOR PORTS

Port	Loaded		Discharged	
	Revenue tonnes (a)	Gross weight tonnes (a)	Revenue tonnes (a)	Gross weight tonnes (a)
Fremantle	7,119,555	6,991,747	3,213,432	2,812,654
Other ports —				
Bunbury	3,651,786	3,651,786	586,905	586,358
Cape Cuvier	365,020	365,020	-	-
Dampier	38,205,697	37,967,979	222,968	216,168
Geraldton	2,055,600	1,942,630	111,559	99,303
Port Hedland	30,132,682	29,360,869	148,201	143,520
Port Walcott	14,007,971	14,007,971	-	-
Yampi Sound	2,220,328	2,220,328	-	-
Other	3,011,926	3,011,690	252,978	245,352
Total	93,651,010	92,528,273	1,322,611	1,290,701
All ports	100,770,565	99,520,020	4,536,043	4,103,355

(a) See text preceding table.

Table 19.17 shows the amount of cargo loaded and discharged at each port during 1985-86. Cargo statistics are recorded in both revenue tonnes and gross weight tonnes. A revenue tonne is the basis on which freight is charged and may be measured by mass (tonnes) or volume (cubic metres). Gross weight is the total weight of cargo excluding the weight of containers, irrespective of the basis on which freight is charged.

Apart from general cargo, overseas consignments discharged were principally petroleum and petroleum products, rock phosphate, caustic soda, iron, steel and sulphur. Outward cargoes from Fremantle consisted largely of alumina, cereal grains, wool, refined petroleum and sheep. Cargo loaded at Esperance comprised mainly cereal grains, zinc and copper concentrates, and salt; and at Albany cereal grains, sheep and tallow. At Bunbury the principal cargoes loaded were alumina, mineral sands, woodchips and cereal grains. Cereal grains and mineral sands were the main items loaded at Geraldton. Principal cargoes loaded in the northern part of the State were iron ore from Dampier, Port Hedland, Port Walcott and Yampi. Salt was loaded at Carnarvon, Dampier and Port Hedland.

The Western Australian Coastal Shipping Commission was established in 1965 to carry on the services formerly maintained by the State Shipping Service. The Commission's ships operate along the north-west and northern coasts, calling regularly at ports between Fremantle and Darwin (Northern Territory). Besides general cargo, the freight discharged at north-west and northern ports consists mainly of refined petroleum pro-

ducts, bulk cement and other building and construction materials, refrigerated cargo, vehicles and drilling equipment. Cargoes carried south to Fremantle are mainly primary products (such as meat, grains and prawns) and vehicles.

The Commission also maintains a regular link between Fremantle, Bunbury, Melbourne and Tasmanian ports, bringing a range of general cargo including newsprint, other paper products and steel into the State and carrying Western Australian goods (mainly ilmenite, wheat, chemicals and furniture) eastward, principally to Tasmanian ports.

Administration of ports

The State Government, through the Marine and Harbours Department, controls the ports at Broome, Carnarvon, Derby, Port Walcott (Cape Lambert) and Wyndham. The ports at Albany, Bunbury, Esperance, Fremantle, Geraldton and Port Hedland are controlled by separately constituted authorities established by Act of Parliament. Private operators control the ports (or landing points) at Barrow Island, Cape Cuvier, Dampier, Exmouth, Useless Loop and Yampi.

Description of principal ports

A brief description of the principal ports, at 30 June 1987 is given below. References to previous articles on ports appears in the *Appendix*.

Albany. The port of Albany (35°S latitude) is the most southerly port in Western Australia and comprises the waters of Princess Royal Harbour and King George Sound. The effect

of tidal movements is negligible and as there is little trouble from fog or storm it is an all-weather port. It embraces an area of 11,800 hectares having an abundance of natural deep water and affording excellent protection to shipping and shore works.

Access to Princess Royal Harbour from King George Sound is by means of a channel of 12.2 metres minimum depth and 145 metres wide.

Bunbury. The port of Bunbury (33°S latitude) is situated in Koombana Bay, 104 nautical miles south of Fremantle, and comprises an inner and outer harbour. It is an all-weather port with a tidal rise and fall of 0.8 metres influenced by weather conditions.

Access to the inner harbour is by means of a dredged channel approximately 24 kilometres in length, 12.2 metres in depth and 121 metres wide.

Esperance. The port of Esperance (33°S latitude) is situated in Esperance Bay on the south coast of Western Australia.

The port has two land-backed berths of concrete and steel construction. The approach channel to the berths is 244 metres wide and is dredged to a depth of 11.0 metres. The deepest permissible loading draft is 10 metres.

Fremantle. The port of Fremantle (32°S latitude) is the principal port of Western Australia. It is an all-weather port, virtually tideless and little troubled by storm or fog. The port provides modern facilities for the handling of ships, passengers and cargo and is connected to the road and rail systems of Western Australia and Australia generally. It has an area of 87,600 hectares and comprises an Inner Harbour and an Outer Harbour.

The Inner Harbour which is constructed within the mouth of the Swan River, is approached through a short entrance channel

dredged to a depth of 11 metres at low water. It encloses 81 hectares of water dredged throughout to 11 metres at low water and is the centre of the general cargo trade of the port.

The Outer Harbour is protected from the west by islands and reefs. It embraces three main anchorages of depths of up to 19 metres. Gage Roads, the most northerly of these anchorages, serves as an approach to the Inner Harbour. Owen Anchorage is centrally situated between Success and Parmelia Banks. The largest and most protected of the anchorages, Cockburn Sound, lies to the south and serves the Kwinana industrial area.

Geraldton. The port of Geraldton (28°S latitude) is situated in Champion Bay on the west coast, 215 nautical miles in a north-westerly direction from Fremantle. The outer harbour, which is 10 metres deep, provides a good holding anchorage. The inner harbour, enclosed by a breakwater, affords ample protection for shipping and shore works. The depth of the inner harbour is 9.1 metres, but the rock base of the entrance channel restricts the loaded draught of vessels to 8.7 metres. With the use of tides, vessels may load to 9.1 metres at mean sea level (0.8m tide), or to 9.3 metres at mean higher high water (1.1 m tide).

Port Hedland. Port Hedland (20°S latitude) is situated on the north-west coast of Western Australia, 957 nautical miles from Fremantle. Access to the harbour is by means of a dredged channel approximately 20 kilometres in length with a further 25 kilometres delineated by beacons. The channel has a minimum depth of 14.1 metres, and minimum width of 183 metres. Subject to the height of tide, the channel is navigable by vessels of up to 250,000 tonnes deadweight, and 325 metres in length with a maximum draft of 18.35 metres.

Communication

TELECOMMUNICATIONS

Internal services

Telecommunications services throughout Australia are controlled by the Australian Telecommunications Commission (Telecom). Telephone services available include teleconferencing as well as the standard exchange and public telephone services. Other services available include radio paging, videotex, teletex, telex and telegraphic services.

To improve the capacity and security of the service in Western Australia, some new developments have been undertaken. An optical fibre cable will be installed between Perth and Port Augusta by 1989. A digital radio system and tail optical fibre cable system is being installed between Perth and the Overseas Telecommunications Commission (OTC) premises at Gnangara to link with Melbourne and Sydney OTC gateway exchanges. Work has been completed on the land section of the Australian-Indonesia-Singapore submarine cable between Whitfords Beach and Gnangara.

Table 19.18 is a summary of Telecom operations in Western Australia for the three years ended 30 June 1987.

TABLE 19.18 - TELECOM OPERATIONS IN
WESTERN AUSTRALIA
(Source: Telecom)

	1984-85	1985-86	1986-87
Telegrams despatched—			
Within Australia	281,071	310,284	263,674
Beyond Australia	65,064	55,701	39,887
Telephone exchanges (a)	639	632	612
Telephone services—			
Metropolitan (b)	402,033	427,542	448,038
Country	138,541	148,348	157,172
Total	540,574	575,890	605,210
Telex services (a)	5,036	5,206	4,686
Telex internal calls ('000) (c)	5,320	5,578	3,979
Data services (a)—			
Datel services	7,887	6,989	7,493
Digital data services	n.a.	2,207	4,235

(a) At 30 June. (b) Within a 32 kilometre radius of the General Post Office, Perth. (c) Includes Post Office official traffic.

The Royal Flying Doctor Service of Australia, through its extensive radio network,

provides general telegram and radio-telephone facilities in addition to medical aid and advice in remote areas.

External services

The Overseas Telecommunications Commission (OTC) is responsible for telecommunication services between Australia and other countries.

Australia, represented by the Commission, is a member of the management body of the International Telecommunications Satellite Consortium (INTELSAT) which, in 1964, established a global communications satellite system. The Commission operates five standard earth stations (Carnarvon and Perth in Western Australia, Ceduna in South Australia, Healesville in Victoria and Moree in New South Wales) which communicate via satellite with stations in other countries.

In addition to transmission via satellite, OTC also uses submarine cables and high frequency radio for its services.

The Commission operates a coastal radio service which provides essential maritime communications covering distress signals, air-sea rescue and naval traffic. OTC also provides communications with ships at sea. Coastal radio stations in Western Australia are located at Perth, Broome, Carnarvon, Esperance and Geraldton.

In association with Telecom, OTC provides telephone, electronic mail, television and many other telecommunications services to other countries.

Radio communication station operators in Australia are licensed by the Department of Transport and Communications. These stations can be run by either organisations or private individuals and can be licensed to operate from fixed or mobile points.

Internal satellite communications services

Australia's National Satellite System is owned and operated by AUSSAT Pty Ltd, a company established in 1981 to provide internal satellite communications for Australia and neighbouring regions.

AUSSAT's first two satellites were launched from Cape Canaveral in the United States of America on the Space Shuttles *Discovery*

and *Atlantis* in August and November 1985. They began commercial operations on 1 January 1986. A third satellite was launched in September 1987 from Kourou, French Guiana, on the European Space Agency's *Ariane* rocket.

The major access points to the satellite system are though the company's eight major City Earth Stations located in each capital city. In Western Australia, the station is located at Lockridge, eleven kilometres north-east of Perth. Two stations—Belrose in Sydney and Lockridge—are responsible for monitoring and controlling the status of the orbiting satellites (Tracking, Telemetry, Command and Monitoring Stations). The Lockridge facility is equipped with a tracking and telemetry dish, two communications antennas for sending and receiving telecommunications and broadcasting signals and a microwave tower for land-based signal sending and receiving.

Each satellite has two national beams in the 'uplink' direction (ground to satellite) that can receive signals from anywhere in Australia and from offshore regions. In the 'downlink' direction, each has two national beams and four spot beams covering:

- Western Australia (the Western Australian beam)
- Queensland (the North-East beam)
- South Australia, Northern Territory (the Central Australian beam)
- New South Wales, Victoria, Tasmania, Lord Howe and Norfolk Islands (the South-East beam).

In addition the third satellite has a beam which covers the south-west Pacific region including New Zealand.

AUSSAT's domestic satellite communications system complements existing land-based communications systems. It provides Telecom services to remote areas and improved communications for mining and exploration companies; provides emergency service organisations with more reliable communications than land-based systems; enables government departments, financial institutions and businesses generally to use AUSSAT for voice, video and data transmission; provides improved communications links between air traffic control centres and aircraft; enables television and radio ser-

vices to reach more remote areas through the Australian Broadcasting Service (ABS) Homestead and Community Broadcast Satellite Service and a Remote Commercial Television Service; and provides a more cost-effective and flexible means for establishing interactive distance education.

Radio and television services

Radio broadcasting stations have operated in Western Australia since 1924 when station 6WF (Westralian Farmers) opened in Perth.

Full scale transmission from a television station in Western Australia began in 1959 with the commercial station TVW 7 (Channel 7).

The Australian Broadcasting Tribunal is responsible for the licensing of all commercial radio and television stations with the national broadcasting and television services being under the control of the Australian Broadcasting Corporation. A detailed list of all radio and television stations operating in Western Australia at 30 June 1985 appears in the *Western Australian Year Book* No. 24—1986. Any additional stations now operating are contained in footnotes in Table 19.19 which shows the number of radio and television services in Western Australia at 30 June 1986.

Table 19.19 - RADIO AND TELEVISION STATIONS
At 30 June 1986

	National	Commercial	Public
Radio stations	30	19	3
Radio translator stations (a)	-	3	-
Television stations	16	6	-
Television translator stations (a) (b)	48	17	-
Television repeater stations (c)	-	5	-

(a) Low powered stations which receive signals from a parent station or another translator station and re-transmit the signal. (b) Includes six national and one commercial station established under the Self-help Television Reception Scheme (STRS). A commercial station at Mullewa operating under the parent station GTW11 Geraldton is now operating. (c) Low powered stations designed to transmit only programs recorded on magnetic tape. CKWR Cockatoo Island ceased operations on 30 May 1986 and is not included.

The Australian Broadcasting Tribunal approved a third commercial television licence for Perth in July 1986. The new station will operate as NEW 10 from mid 1988.

The Special Broadcasting Service (SBS) was extended to Perth in March 1986. Programs

originate in Sydney and are relayed to transmitters in each State via the AUSSAT satellite.

POSTAL SERVICES

Postal services throughout Australia are controlled by the Australian Postal Commission (Australia Post). Postal services made available by Australia Post include courier electronic mail services and standard mail services.

Statistics on the number of post offices and postal articles handled by Australia Post in Western Australia from 1984-85 to 1986-87 are shown in Table 19.20.

Table 19.20 - AUSTRALIA POST OPERATIONS
WESTERN AUSTRALIA
(Source: Australia Post)

	1984-85	1985-86	1986-87
Post offices at 30 June (a)	411	411	400
Postal articles handled (b) ('000)—			
Posted for delivery within Australia	224,582	241,081	252,084
Posted for delivery overseas	10,769	11,733	13,039
Received from overseas	10,864	12,398	12,988
Total	246,215	265,212	265,123

(a) Official and non-official. (b) Includes standard letters, non-standard and registered articles and parcels.

REFERENCES

ABS Publications

Motor Vehicle Registrations, Western Australia 1986-87 (9304.5)

Vehicles on Register, Western Australia, 30 June 1987 (9305.5)

Survey of Motor Vehicle Use, Twelve Months Ended 30 September 1985 (9208.0)

Road Traffic Accidents Involving Casualties, Reported to the Police Department, Western Australia, 1986 (9406.5)

Other publications

Main Roads Department, *Annual Report 1987*

Main Roads Department, *Distance Book - Edition 5*

Traffic Board of Western Australia, *Annual Report 1987*

Bikeplan Study Team, *Perth Metropolitan Region, Mandurah Region and Greater Bunbury Bikeplans*

Transperth, *Annual Report 1987*

Westrail, *Annual Report 1987*

Department of Aviation, *Air Transport Statistics, Domestic Air Transport*

Department of Aviation, *Air Transport Statistics, International Air Transport*

Department of Transport, Western Australia, *Annual Report 1987*

Telecom, *Annual Report 1987*

Australian Broadcasting Tribunal, *Annual Report 1987*

Australian Broadcasting Commission, *Annual Report 1987*

Australia Post, *Annual Report 1987*

Chapter 20

FOREIGN AND INTERSTATE TRADE

Foreign trade statistics are compiled from information contained in documents prepared by importers and exporters or their agents in accordance with the Customs Act. Particulars of Western Australia's foreign trade, as presented in this Chapter, are derived from data supplied by the Australian Bureau of Statistics, Canberra.

Statistics of Western Australia's trade with other Australian States are compiled by the Western Australian Office of the ABS from information contained in documents collected under authority of the *Census and Statistics Act 1905* from importers, exporters and other persons concerned with the distribution of goods.

The Customs Tariff

The first Commonwealth Customs Tariff was introduced on 8 October 1901, from which date uniform duties came into effect throughout Australia. The Australian Customs Tariff was developed in conformity with the policy of protecting economic and efficient Australian industries and of granting preferential treatment to imports from certain countries. Duties are imposed on some goods, generally of a luxury nature, for revenue purposes. Customs collections are a major source of revenue, but in its protective character the tariff has an important influence on the Australian economy.

The Australian Customs Tariff in use until December 1987 was introduced on 1 July 1965. The nomenclature used in the Tariff is that of the Convention on Nomenclature for the Classification of Goods in Customs Tariffs, an international agreement signed at Brussels on 15 December 1950. The system of naming established by the Convention is known as the 'Customs Co-operation Council Nomenclature' (previously the Brussels Tariff Nomenclature).

Classification of commodities

Foreign imports and exports are classified according to the Australian Import and Export Commodity Classifications of some 6,000 import items and 2,500 export items. These classifications are based on the *United Nations Standard International Trade Classification, Revision 2*, which is closely related to the Customs Co-operation Council Nomenclature (previously known as the Brussels Tariff Nomenclature) used in the Australian Customs Tariff. The standard International Trade Classification consists of

10 broad commodity categories designated 'Sections' and comprising 62 commodity 'Divisions' which are further divided into 233 commodity 'Groups'. The structure of the classification serves to provide a summary of data relating to 1,818 basic items of international trade.

Interstate imports and exports are classified according to Interstate Trade Commodity Classifications which are based on the Australian Export Commodity Classification and the Australian Import Commodity Classification. The basic items of the Australian classifications are compressed or expanded according to their significance in Western Australia's trade to form interstate trade commodity categories.

The Harmonised Commodity Description and Coding System

On 1 January 1988, Australia adopted the new Harmonised Commodity Description and Coding System (H.C.D.C.S.). This system will be used internationally and replaces the Australian Import Commodity Classification and the Customs Tariff which are mentioned earlier in the Chapter. The new classification for imports is the Australian Harmonised Import Commodity Classification (A.H.I.C.C.). The Australian Harmonised Export Commodity Classification (A.H.E.C.C.) which is based on the H.C.D.C.S. replaces the Australian Export Commodity Classification.

These new classifications update those used formerly to reflect technological development and changes in international trade. They provide international uniformity in classifying and coding goods, and simplify the task of collecting, analysing and compar-

ing foreign trade statistics. The A.H.I.C.C. and A.H.E.C.C. contain some 8,200 and 6,200 items respectively.

From January 1988, all import and export transactions are reported to the Australian Customs Service according to the H.C.D.C.S. classifications.

Valuation of items of trade

Foreign trade. All values in foreign trade statistics are determined on a 'free on board (f.o.b.) port of shipment' basis. This means that all charges (in particular the cost of freight and insurance) incurred after the goods have been exported from the port of shipment are excluded. Only transport and service charges incurred, or usually incurred, prior to export are included in the determination of trade values.

Re-exports are defined as goods, materials or articles which are exported either in the same condition as they were in when imported, or after minor repair or operations which leave them unchanged. These minor operations include blending, packaging, bottling, cleaning, sorting, husking or shelling.

Interstate trade. Statistics of goods imported from other Australian States are recorded in terms of landed cost. The basis of valuation for goods exported to other Australian States is f.o.b., or its equivalent, at the point of final shipment.

Direction of trade

The term *Country of Origin*, as used in recording the statistics of foreign trade, means the country of production; *Country of Destination* means the country to which goods were consigned at the time of export. In compiling statistics of Western Australia's interstate imports and exports, goods are classified according to the State or Territory from which or to which they were consigned.

Summary of trade

TABLE 20.1 - VALUE OF IMPORTS INTO AND EXPORTS FROM WESTERN AUSTRALIA CLASSIFIED ACCORDING TO ORIGIN OR DESTINATION: 1986 (\$'000)

Origin or destination	Imports	Exports
Interstate (a)—	4,816,921	1,623,017
Overseas—		
Argentina	2,620	41,557
Bahrain	101	72,859
Bangladesh	565	2,627
Belgium-Luxembourg	19,397	55,079
Brazil	6,868	8,226
Canada	62,303	89,849
China —		
excluding Taiwan Province	19,036	364,553
Taiwan Province only	50,359	165,820
Christmas Island	7,980	3,504
Denmark	9,322	376
Egypt, Arab Republic of	5	201,444
Fiji	39	2,246
Finland	13,519	20,202
France	54,358	109,045
Germany, Democratic Republic of	247	5,366
Germany, Federal Republic of	123,651	208,205
Hong Kong	20,560	109,834
India	7,749	33,712
Indonesia	55,359	196,922
Iran, Islamic Republic of	121	39,706
Iraq	-	12,360
Italy	65,263	144,307
Japan	519,786	2,129,337
Jordan	8,713	7,805
Korea, Republic of	41,924	233,404
Kuwait	33,773	23,134
Libyan Jamahiriya	-	18
Malaysia	19,128	58,178
Nauru, Republic of	13,696	-
Netherlands, Kingdom of the	65,317	75,730
New Zealand	38,136	64,637
Norway	7,440	527
Pakistan	1,927	9,478
Papua New Guinea	2,941	6,580
Philippines, Republic of	6,866	14,289
Poland	854	22,944
Qatar	89,119	7,725
Saudi Arabia	19,198	126,673
Singapore, Republic of	131,714	107,811
South Africa, Republic of	21,060	70,695
Spain	6,493	22,902
Sri Lanka	2,168	14,966
Sweden	25,070	4,880
Switzerland	9,788	29,198
Thailand	11,641	3,664
Union of Soviet Socialist Republics	432	346,296
United Arab Emirates	47,521	60,119
United Kingdom	155,999	141,967
United States of America	349,585	807,821
Yemen, People's Democratic Republic of	54	4,517
Yugoslavia	2,072	4,527
Other countries, country unknown and re-exports	49,633	245,835
Total overseas	2,201,469	6,533,438
Total	7,018,390	8,156,455

(a) Excludes interstate value of horses. Also excludes value of interstate ships' stores.

Statistics of Western Australia's external trade are presented in tables 20.1 to 20.4. Particulars relate, in all cases, to the year ended 30 June.

Table 20.1 includes data for foreign and interstate trade; Tables 20.2 and 20.3 relate to foreign trade only while Table 20.4 relates to Western Australian trade with other Australian States and Territories.

**TABLE 20.2 - VALUE OF FOREIGN EXPORTS OF
SELECTED COMMODITIES
MAIN COUNTRIES OF DESTINATION: 1985-86
(\$'000)**

<i>Commodity and destination</i>	<i>Value</i>
Iron ore and concentrates—	
Japan	1,139,161
China - excluding Taiwan Province	198,404
Korea, Republic of	142,340
Germany, Federal Republic of	117,345
China - Taiwan Province only	88,935
United Kingdom	40,631
France	38,624
Italy	38,163
Belgium - Luxembourg	14,701
Spain	10,827
Philippines, Republic of	10,451
Netherlands, Kingdom of the	10,220
Total exports	1,861,779
Wheat, unmilled —	
Union of Soviet Socialist Republics	205,727
Egypt, Arab Republic of	199,774
China - excluding Taiwan Province	135,991
Japan	129,156
Indonesia	106,284
Yemen Arab Republic	67,260
Iran	34,981
Korea, Republic of	27,897
Sri Lanka	17,048
Malaysia	15,508
Iraq	12,328
Total exports	993,295
Wool, greasy—	
Union of Soviet Socialist Republics	137,387
Japan	78,265
Germany, Federal Republic of	57,479
France	47,093
Italy	43,720
China - Taiwan Province only	23,592
Poland	22,003
Korea, Republic of	12,773
United States of America	8,223
Turkey	5,768
Czechoslovakia	5,499
United Kingdom	5,401
Malaysia	5,166
Total exports	503,013
Gold bullion—	
Japan	319,877
Hong Kong	82,716
United Kingdom	39,568
Total exports	458,728
Petroleum and petroleum products—	
New Zealand	39,585
Singapore, Republic of	29,242
Japan	17,489
India	8,977
Total exports	180,134

**TABLE 20.2 - VALUE OF FOREIGN EXPORTS OF
SELECTED COMMODITIES
MAIN COUNTRIES OF DESTINATION: 1985-86 —
continued
(\$'000)**

<i>Commodity and destination</i>	<i>Value</i>
Barley, unmilled—	
Saudi Arabia	73,568
Japan	24,091
China - Taiwan Province only	10,237
Brazil	8,225
Total exports	128,061
Wool, degreased—	
Italy	31,688
Japan	20,629
China - Taiwan Province only	13,564
Germany, Federal Republic of	4,243
Total exports	109,190
Rock lobsters, whole and tails, fresh or frozen—	
United States of America	83,203
Hong Kong	13,551
Total exports	98,547
Salt—	
Japan	60,909
China - Taiwan Province only	14,577
Korea, Republic of	13,429
Total exports	93,363
Live sheep and lambs for human consumption—	
Saudi Arabia	43,474
Kuwait	16,888
United Arab Emirates	8,175
Qatar	7,085
Yemen, People's Democratic Republic of	2,294
Total exports	84,418
Beef and veal, fresh, chilled or frozen—	
United States of America	45,567
China - Taiwan Province only	9,163
Total exports	76,709
Feeding stuff for animals—	
Netherlands, Kingdom of the	26,102
Japan	7,747
Total exports	64,161
Zirconium—	
Japan	21,497
Total exports	50,568
Ilmenite (a) and leucosene—	
United States of America	18,514
Total exports	45,149
Mutton and lamb, fresh, chilled or frozen—	
Japan	11,602
United Kingdom	3,352
Total exports	41,766
Rutile—	
United States of America	14,636
Japan	7,949
Total exports	31,144
Diamonds, rough, unsorted—	
Belgium - Luxembourg	9,011
Total exports	15,880
Hides and skins—	
Italy	11,932
Total exports	13,979

(a) Excludes beneficiated ilmenite.

TABLE 20.3 - VALUE OF FOREIGN TRADE WITH SELECTED COUNTRIES BY SELECTED DIVISIONS: 1985-86
(\$'000)

Division	Description	Imports				Exports			
		United States of Japan	United Kingdom America	United Kingdom America	All countries	United States of Japan	United Kingdom America	United Kingdom America	All countries
01	Meat and meat preparations	-	3	309	668	16,208	46,756	4,332	129,321
03	Fish, crustaceans and molluscs, and preparations thereof	4,216	1,346	1,091	29,104	65,677	84,344	2	159,516
04	Cereals and cereal preparations	118	638	948	5,123	175,866	-	103	1,146,180
05	Vegetables and fruit	67	2,834	456	15,145	449	112	663	31,196
08	Feeding stuff for animals (excluding unmilled cereals)	21	2,387	6	5,384	7,747	-	-	64,161
11	Beverages	51	827	1,882	8,140	-	2	75	641
24	Cork and wood	-	1,057	1	7,167	-	1,004	5,808	7,330
26	Textile fibres (other than wool tops) and their wastes (not manufactured into yarn or fabric)	919	99	920	9,171	98,894	27,146	11,649	614,644
27	Crude fertilisers and crude minerals excluding coal, petroleum and precious stones)	21	4,688	100	63,264	68,437	710	84	123,904
28	Metalliferous ores and metal scrap	77	1,022	18	2,607	1,195,666	401,178	52,912	2,027,105
29	Crude animal and vegetable materials, n.e.s.	833	192	125	5,219	1,504	1,194	123	10,242
33	Petroleum, petroleum products and related materials	1	2,096	106	339,936	17,489	5,989	-	180,134
51	Organic chemicals	2,884	2,717	2,422	15,535	-	-	-	44
52	Inorganic chemicals	2,954	2,244	7,268	23,798	8	-	-	2,719
56	Fertilisers, manufactured	750	22,259	12	41,730	-	-	-	248
58	Artificial resins and plastic materials and cellulose esters and ethers	1,933	4,899	2,910	19,626	152	15	-	789
59	Chemical materials and products, n.e.s.	371	3,359	8,337	23,007	98	500	368	2,176
62	Rubber manufactures, n.e.s.	28,470	4,209	2,393	48,605	-	-	1	195
64	Paper, paperboard, and articles of paper pulp, of paper or of paperboard	4,939	1,937	1,556	39,611	2	11	1	3,090
65	Textile yarn, fabrics, made-up articles n.e.s. and related products	4,763	1,583	3,981	43,479	8	371	-	1,278
66	Non-metallic mineral manufactures, n.e.s.	8,438	3,025	3,677	44,511	1,487	7,907	43	30,869
67	Iron and steel	37,997	2,488	3,248	59,823	-	60	-	774
68	Non-ferrous metals	108	269	328	3,182	-	2,286	3,629	6,063
69	Manufactures of metal, n.e.s.	10,173	13,679	4,274	62,760	292	3,072	28	13,407
71	Power generating machinery and equipment	8,445	23,605	9,611	62,562	17	59	7	1,370
72	Machinery specialised for particular industries	50,837	60,870	17,907	201,164	-	1,195	86	8,730
73	Metalworking machinery	2,927	9,819	1,514	21,511	-	371	46	1,039
74	General industrial machinery and equipment n.e.s. and machine parts, n.e.s.	19,944	31,796	11,289	112,394	85	571	258	2,931
75	Office machines and automatic data processing equipment	2,582	7,859	751	20,240	15	2,499	64	3,116
76	Telecommunications and sound recording and reproducing apparatus and equipment	29,505	8,018	4,791	51,516	16	27	6	687
77	Electrical machinery, apparatus and appliances n.e.s. and electrical parts	23,102	8,107	5,545	56,050	1	155	172	3,244
78	Road vehicles (including air cushion vehicles)	170,110	48,066	9,464	265,053	-	195	40	1,200
79	Other transport equipment	906	3,452	6,140	44,411	-	778	1,366	6,596
87	Professional, scientific and controlling instruments and apparatus, n.e.s.	3,844	18,492	4,556	37,721	3	604	81	1,849
88	Photographic apparatus, equipment and supplies and optical goods, n.e.s., watches and clocks	1,657	1,138	919	6,420	5	341	1	724
Total (a)		519,786	349,585	152,900	2,201,469	2,129,283	807,616	141,575	6,516,203

(a) Includes details not available for publication and divisions not shown separately.

TABLE 20.4 - VALUE OF INTERSTATE IMPORTS AND EXPORTS (a) — SELECTED DIVISIONS
(\$'000)

Division	Description	Imports			Exports		
		1983-84	1984-85	1985-86	1983-84	1984-85	1985-86
00	Live animals, chiefly for food	8,029	9,299	7,050	7,038	5,933	2,900
01	Meat and meat preparations	37,765	30,471	41,573	8,617	10,527	10,259
02	Dairy products and birds' eggs	36,816	37,905	43,889	n.p.	n.p.	n.p.
03	Fish, crustaceans and molluscs, and preparations thereof	6,594	6,990	10,160	15,806	16,391	28,348
04	Cereal grains and cereal preparations	51,282	54,770	64,148	n.p.	2,004	2,364
05	Vegetables and fruit	75,174	90,730	94,827	8,056	6,124	7,928
06	Sugar, sugar preparations and honey	30,088	29,105	33,173	n.p.	n.p.	n.p.
07	Coffee, tea, cocoa, spices and manufactures thereof	53,689	55,731	65,407	n.p.	753	967
08	Feeding stuff for animals (excluding unmilled cereals)	21,868	23,214	28,090	293	n.p.	n.p.
11	Beverages	59,499	67,413	78,836	8,433	n.p.	n.p.
12	Tobacco and tobacco manufactures	128,710	123,211	140,661			
24	Cork and wood	5,031	6,024	6,039	7,449	n.p.	n.p.
28	Metalliferous ores and metal scrap	n.p.	-	n.p.	225,308	257,314	251,354
51	Organic chemicals	14,427	14,550	13,483	n.p.	n.p.	n.p.
52	Inorganic chemicals	22,146	22,341	27,533	n.p.	n.p.	n.p.
53	Dyeing, tanning and colouring materials	23,195	27,476	32,584	1,605	n.p.	1,886
54	Medicinal and pharmaceutical products	73,883	77,237	87,655	n.p.	n.p.	n.p.
55	Essential oils and perfume materials; toilet, polishing and cleansing preparations	93,549	98,676	116,906	865	104	134
58	Artificial resins and plastic materials, and cellulose esters and ethers	61,087	68,475	97,197	3,784	4,056	4,862
62	Rubber manufactures, n.e.s.	41,805	49,731	36,041	3,412	4,053	3,885
64	Paper, paperboard, and articles of paper pulp, of paper or of paperboard	98,697	107,611	130,445	15,667	16,062	18,368
65	Textile yarn, fabrics, made-up articles n.e.s. and related products	112,631	137,260	153,600	n.p.	n.p.	n.p.
66	Non-metallic mineral manufactures, n.e.s.	43,673	48,081	60,576	15,747	15,283	16,606
67	Iron and steel	207,677	229,800	293,811	n.p.	26,042	26,287
68	Non-ferrous metals	44,369	53,314	61,803	6,211	10,170	13,813
71	Power generating machinery and equipment	34,623	44,580	39,769	6,728	6,446	6,810
72	Machinery specialised for particular industries	108,917	140,235	143,507	80,859	68,073	47,326
73	Metalworking machinery	7,397	10,198	9,713	3,623	4,603	4,658
74	General industrial machinery and equipment, n.e.s. and machine parts n.e.s.	140,215	166,972	189,730	18,813	22,135	30,664
75	Office machines and automatic data processing equipment	68,398	118,888	123,176	2,505	2,347	4,898
76	Telecommunications and sound recording and reproducing apparatus and equipment	79,308	102,510	98,804	2,571	3,343	2,960
77	Electrical machinery, apparatus and appliances, n.e.s. and electrical parts thereof	173,469	199,858	225,502	7,366	5,821	7,851
78	Road vehicles (including air cushion vehicles)	445,850	584,214	606,560	10,054	9,292	13,188
81	Sanitary, plumbing, heating and lighting fixtures and fittings, n.e.s.	15,119	17,798	18,639	n.p.	n.p.	n.p.
82	Furniture and parts thereof	18,593	22,962	23,069	24,947	56,288	47,069
84	Articles of apparel and clothing accessories	155,101	178,261	189,118	39,920	54,575	64,243
85	Footwear	47,345	52,138	67,102	2,584	1,530	2,136
87	Professional, scientific and controlling instruments and apparatus, n.e.s.	54,873	55,816	70,002	2,130	1,930	2,846
88	Photographic apparatus, equipment and supplies and optical goods, n.e.s., watches and clocks	36,096	42,701	48,037	517	877	1,657
Total (a) (b)		3,638,883	4,291,229	4,816,921	1,404,145	1,507,370	1,623,017

(a) Excludes the value of horses. Also excludes the value of interstate ships' stores. (b) Includes details not available for publication and divisions not shown separately.

Chapter 21

EMPLOYMENT AND INDUSTRIAL CONDITIONS

In addition to the employment data appearing in this Chapter, references to the number of persons engaged in particular activities are to be found elsewhere in the Year Book. Chapter 10, for example, shows numbers engaged in teaching and Chapter 8 contains details of hospital staff. Employment in building appears in Chapter 18. Chapter 14 provides information on employment in mining, and Chapter 16 includes tables relating wholly, or in part, to employment in factories. Chapter 17 gives numbers employed in retail establishments.

THE LABOUR FORCE

Fundamental to the measurement of employment is the concept of the labour force. The labour force is defined broadly as those persons aged 15 and over who, during a particular week, are either employed or unemployed. The labour force represents the total official supply of labour available to the labour market during a given week. Estimates of the labour force are obtained through the Population Survey, which is conducted monthly by means of personal interviews at a sample of households throughout Australia. The survey provides particulars of the demographic and labour force characteristics of the population.

Detailed estimates of employees by industry are also collected from employers through a quarterly Survey of Employment and Earnings. All wage and salary earners are represented in the survey except employees of enterprises mainly engaged in agriculture, forestry, fishing and hunting; employees in private households employing staff; employees of foreign embassies and members of defence forces.

This section provides some summary statistics on the civilian labour force drawn from the Australian Bureau of Statistics monthly Labour Force Survey. Table 21.1 shows estimates of the employment status for males and females aged 15 years and above in Western Australia during August 1981 and 1986.

TABLE 21.1 - LABOUR FORCE—EMPLOYMENT STATUS
(‘000 persons)

Employment status	August	
	1981	1986
MALES		
Employed	357.0	390.9
Unemployed	20.6	31.8
Not in labour force	105.0	122.1
Total	482.5	544.8
FEMALES		
Employed	205.7	255.8
Unemployed	16.7	22.0
Not in labour force	258.1	266.7
Total	480.5	544.5

TABLE 21.2 - LABOUR FORCE PARTICIPATION RATES
(per cent)

Age Group	August	
	1981	1986
MALES		
15 - 19	65.7	65.5
20 - 24	88.6	91.1
25 - 44	94.9	94.6
45 - 54	91.9	90.5
55 - 64	66.8	62.0
65	6.9	6.2
Total	78.2	77.6
FEMALES		
15 - 19	65.5	65.8
20 - 24	65.8	74.9
25 - 44	55.4	62.5
45 - 54	47.4	55.7
55 - 64	22.6	25.1
65	*	*
Total	46.3	51.0

* Subject to sampling variability too high for most practical purposes.

One of the most important labour force measurements is the participation rate, which represents the proportion of the working age population who are in the labour force. Analysis of the participation rates provides the basis for monitoring changes in the size and composition of labour supply, particularly in terms of age, sex and marital status.

Between August 1981 and August 1986 male labour force participation rates decreased in

all age groups except the 20-24 years group which recorded an increase of 2.5 per cent. Female labour force participation rates, however, increased over all age groups in the same period, the greatest increase being in the 20-24 years group which recorded an increase of 9.1 per cent.

Another valuable insight into the labour market derived from the Labour Force Survey relates to occupational status. Details are shown in Table 21.3 with additional information relating to the marital status of females in the labour force.

TABLE 21.3 - LABOUR FORCE—OCCUPATIONAL STATUS
(^{'000})

Occupational status	1981		1986	
	Married females	Persons	Married females	Persons
Employer	8.4	34.3	11.7	40.0
Self-employed	16.0	64.1	21.0	80.7
Wage or salary earner	95.3	461.5	120.9	517.9
Helper, unpaid	*	2.8	2.8	8.1
Unemployed	5.7	37.2	8.6	53.8
Not in labour force	166.8	363.1	165.7	388.8
Total 15 years and over	293.1	962.9	330.7	1,089.3

* Subject to sampling variability too high for most practical purposes.

The composition of the employed labour force remained relatively constant when comparing August 1981 and August 1986. The number of employers increased from 34,300 (6.1 per cent) to 40,000 (6.2 per cent); self employed persons from 64,100 (11.4 per cent) to 80,700 (12.5 per cent) and wage and salary earners (including unpaid helpers) from 461,500 (82 per cent) to 517,900 (80.1 per cent).

In the same period total employment increased by 84,100 persons from 562,600 to 646,700 and unemployment increased from 37,200 persons to 53,800 persons. This represented an increase in the unemployment rate of 1.5 per cent—from 6.2 per cent to 7.7 per cent.

The employment of married females increased from 120,600 to 156,400 which represented a proportional increase of 3.0 per cent. Unemployed married females increased from 5,700 to 8,600, an increase of 0.7 per cent in the unemployment rate over the period.

In the five years between August 1981 and August 1986 the pattern of employment between industries varied only slightly. Just over 51 per cent of employed persons worked in one of the three major industries: Wholesale and retail trade, Community services or Manufacturing. Other industries which employed in excess of 5 per cent of the labour force were Agriculture, forestry,

fishing and hunting; Construction; Transport and storage; Finance, property and business services; and Recreation, personal and other services.

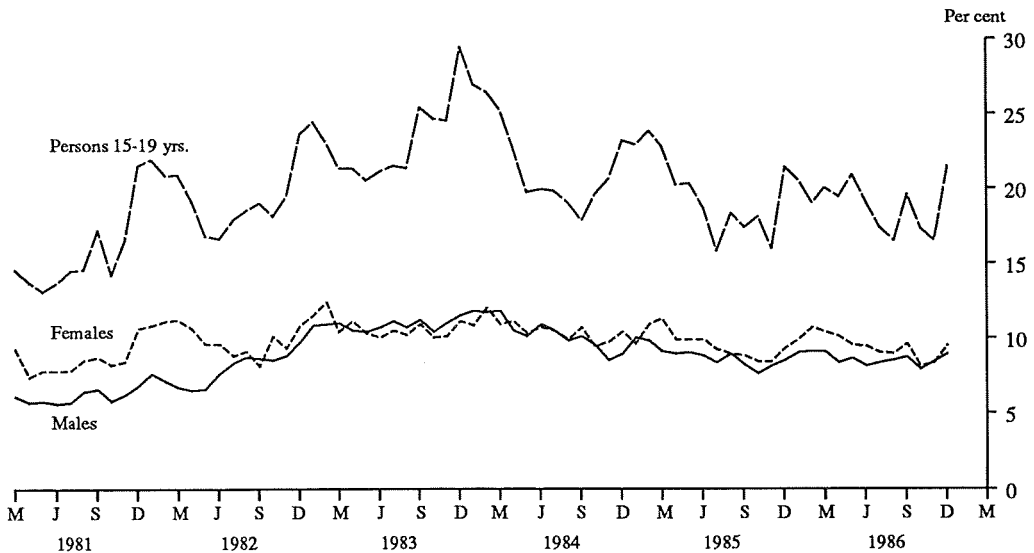
TABLE 21.4 - EMPLOYED PERSONS BY INDUSTRY
(^{'000})

Industry division	August	
	1981	1986
Agriculture, forestry, fishing and hunting	43.7	52.6
Mining	23.2	25.7
Manufacturing	78.9	74.6
Electricity, gas and water	9.8	11.2
Construction	47.9	49.4
Wholesale and retail trade	111.7	132.4
Transport and storage	32.7	35.3
Communication	9.1	9.5
Finance, property and business services	49.2	65.0
Public administration and defence	21.0	22.2
Community services	100.7	124.7
Recreation, personal and other services	34.7	43.9
Total all industries	562.6	646.7

Diagram 21.1 shows unemployment rates in Western Australia from 1981 to 1986 for all males, all females and all persons aged 15 to 19 years.

In this period teenage unemployment rates, that is for persons aged from 15 to 19 years, were between 6% and 18% higher than unemployment rates for all males and all females. Teenage unemployment peaked at 28.4% in December 1983. All male and all female unemployment rates for the same

DIAGRAM 21.1
UNEMPLOYMENT RATES: WESTERN AUSTRALIA
(The unemployed in each group as a percentage of the civilian labour force in the same group)



period were 10.5% and 10.1% respectively. Teenage unemployment was at its lowest in May 1981 at a rate of 12.1%.

All female unemployment peaked at 11.4% in February 1983 and was at its lowest in April 1981 at 6.4%. Male unemployment was at its lowest in June 1981 with a rate of 4.6% and at its highest in January and March of 1981 with a rate of 10.8%.

COMMONWEALTH EMPLOYMENT SERVICE

The main functions of the Commonwealth Employment Service are to assist people seeking employment to obtain positions best suited to their training, experience, abilities and qualifications, and to assist employers seeking labour to obtain employees best suited to the kinds of work being offered. Specialised assistance is provided for young people, the disabled, Aboriginals, rural workers and persons with professional and technical qualifications. Professional counselling provided without charge by a staff of qualified psychologists is available to any person, but it is provided particularly for those persons identified by officers of the Commonwealth Employment Service as be-

ing disadvantaged or suffering a major handicap relating to employment.

The Commonwealth Employment Service also administers several Departmental manpower programs designed to assist the following groups: industries endeavouring to overcome skill shortages; individuals who, because of inadequate, inappropriate or outdated skills, have been displaced from the workforce; unemployed young people looking for employment; and other disadvantaged groups.

There is a Relocation Assistance Scheme designed to assist eligible job-seekers who are unlikely to secure continuing employment in their present locality to move and to allow them to take up continuing employment in another locality within Australia. Special assistance programs providing subsidised employment ranging from apprenticeships to formalised training are available for Aboriginal people. An Integrated Wage Subsidy Program for all persons aged 15 years and over provides for on-the-job subsidised work experience to assist trainees to acquire new skills or update their current skills. Financial assistance is provided to disadvantaged job-seekers aged 18 years and over, enabling them to participate in flexible

training arrangements leading to identified employment opportunities in the labour market.

A traineeship program is aimed at 16-18 year old persons, with priority being given to 16-17 year old school leavers who have not completed Year 12. There is a target throughout Australia of 75,000 traineeships by 1988.

Community Employment Programs provide grants to local authorities, community organisations, State, Territory or Commonwealth Government departments and authorities to develop labour intensive projects while helping to improve community facilities and services. Disadvantaged job-seekers aged 15-24 years can gain on-the-job work experience within Commonwealth Government departments and instrumentalities. There is a Commonwealth Rebate for Apprentice Full Time Training applicable to all apprentices who began their training after 14 January 1977 to encourage employers to train apprentices.

INDUSTRIAL AUTHORITIES

Federal authorities

Federal Court of Australia. The Federal Court of Australia comprises an Industrial Division and a General Division. The Industrial Division deals with all proceedings under the Conciliation and Arbitration Act and related legislation. A single Judge and the Australian Conciliation and Arbitration Commission may refer a question of law for the opinion of the Court. Appeal from a judgement of a Full Court may, in certain circumstances, be made to the High Court of Australia.

Australian Conciliation and Arbitration Commission. The Commission has jurisdiction in respect of the prevention and settlement of industrial disputes extending beyond the limits of any one State. The work of the Commission is normally done by individual members; however, certain matters must be determined by a Full Bench of the Commission consisting of at least three members, of whom not less than two are presidential members. A Full Bench of the Commission also deals with appeals and references from single members of the Commission and from the Public Service Arbitrator.

Western Australian authorities

The Western Australian Industrial Relations Commission can inquire into any industrial matter and make an award, order or declaration relating to such matter. 'Industrial matter' refers generally to any matter affecting or relating to the work, privileges, rights, or duties of employers or employees in any industry and includes any matter relating to the wages, salaries, allowances, or other remuneration of employees or the prices to be paid in respect of their employment; the hours of employment, leave of absence, sex, age, qualification, or status of employees and the mode, terms and conditions of employment including conditions which are to take effect after the termination of employment. The Commission may also make inquiries where industrial action has occurred or is likely to occur.

The Commission in Court Session may make General Orders, hear matters referred by the Commission, and hear appeals from decisions of Boards of Reference.

The Full Bench of the Commission may hear matters on questions of law and appeals from decisions of the Commission and Industrial Magistrates.

An appeal lies to the Western Australian Industrial Appeal Court from decisions of the President of the Western Australian Industrial Relations Commission, the Full Bench or the Commission in Court Session but only on the ground that the decision is erroneous in law or in excess of jurisdiction.

Table 21.5 shows details of the number of industrial awards, organisations of employees and employers, and members registered with the Western Australian Industrial Relations Commission under the Industrial Relations Act.

TABLE 21.5 - INDUSTRIAL AWARDS, EMPLOYEE AND EMPLOYER ORGANISATIONS AND MEMBERS REGISTERED (a)

	<i>At 30 June</i>	
	1981	1986
Awards in force	459	608
Employee organisations (a)—		
Number	68	72
Membership	170,414	176,769
Employer organisations (a)—		
Number	14	15
Membership	2,139	3,561

(a) Before 1 March 1985 the term 'union' was used in lieu of 'organisation.'

EMPLOYER ORGANISATIONS

Both the Confederation of Western Australian Industry (Incorporated) and the Australian Mines and Metals Association (Incorporated) represent employers in all aspects of the negotiation of industrial awards and agreements, in the settlement of industrial disputes, including arbitration, and in direct relationships with employee organisations. Both are members of the Confederation of Australian Industry through which they have overseas affiliation with the International Organisation of Employers.

The Confederation of Western Australian Industry (Incorporated) has approximately 6,000 individual members and 101 affiliated trade, industry and professional associations.

The Australian Mines and Metals Association (Incorporated) is an association of mining and hydrocarbon companies.

EMPLOYEE ORGANISATIONS

Employee organisations in Western Australia cover all forms of occupations—from the unskilled to the professional worker. Most union organisations are national in character with State branches registered with both the Federal and State industrial authorities.

Major organisations are the Trades and Labor Council of Western Australia (TLC) and the Government Employees Industrial Council of Western Australia. These two groups cover most of the wage and salary earners employed in the private and government sectors of industry and commerce.

The TLC is the State branch of the Australian Council of Trade Unions (ACTU) and at 31 December 1986 it was affiliated with 84 State resident unions having a membership of approximately 200,000.

The TLC frequently acts on behalf of employees—before the Western Australian industrial authorities—in matters such as wages, hours, holidays and long service leave.

Table 21.6 gives particulars of employee organisations in Western Australia.

TABLE 21.6 - EMPLOYEE ORGANISATIONS—NUMBERS AND MEMBERSHIP

	At 31 December	At 30 June
	1981	1986
Number of organisations	149	147
Number of members ('000)—		
Males	156.4	167.8
Females	72.7	84.4
Persons	229.1	252.2
Proportion of total employees (a) (per cent)		
Males	54	55
Females	42	39
Persons	49	48

(a) Based on estimates from the Labour Force Survey prior to 1985 and from the Survey of Employment and Earnings after 1985.

APPRENTICESHIP AND INDUSTRIAL TRAINING

At 30 June 1986 the total number of apprentices registered in a wide variety of trades in this State was 10,027.

The Industrial Training Advisory Council is the principal advisory body to the Government on matters relating to industrial training. The Council comprises representatives of the Department of Employment and Training, the Confederation of Western Australian Industry (Incorporated), the Trades and Labor Council of Western Australia, the Technical Education Division of the Education Department and a State instrumentality. The Council is responsible for the overall co-ordination of industrial training arrangements in Western Australia.

An industrial training advisory board for each trade or group of trades, prescribed as an apprenticeship trade or an industrial training trade, is appointed to assist the Council. It also deals with apprenticeship matters relevant to the trade it is appointed to review.

An apprenticeship term of indenture may be for three, three-and-a-half, four or five years depending upon the chosen trade and the apprentice's academic achievements. Satisfactory completion of an approved pre-apprenticeship course conducted by the Technical Education Division of the Education Department may entitle an apprentice to a term of indenture of three years.

Table 21.7 shows the number of new apprenticeship registrations effected during the

twelve months ending 30 June 1986, together with a comparison of the total number of registered apprentices in training in Western Australia at 30 June 1981 and 30 June 1986.

TABLE 21.7 - APPRENTICESHIP—NEW REGISTRATIONS AND NUMBER OF EFFECTIVE REGISTRATIONS TO VARIOUS TRADES

Trade	Effective registrations at 30 June		Resistrations effected during
	1981	1986	1985-86
Building	1,926	1,332	645
Electrical	1,684	1,194	420
Food	923	1,041	3,88
Metal	5,880	3,606	1,332
Printing	301	169	64
Vehicle building	635	470	189
Other	2,045	2,215	956
Total	13,394	20,027	3,994

INDUSTRIAL DISPUTES

Statistics of industrial disputes are compiled by the Australian Statistician from ABS surveys of employers and trade unions concerning individual disputes; reports from government departments and authorities; reports of State and Federal industrial authorities; and information contained in trade journals, employer and trade union publications, and newspaper reports.

Table 21.8 shows particulars of disputes which occurred in the calendar years 1981 and 1986. Diagrams 21.2 and 21.3 show total number of disputes, total workers involved and total days lost in Western Australia from 1981 to 1986.

TABLE 21.8 - INDUSTRIAL DISPUTES (a)

	1981	1986
Number of disputes	364	259
Number of workers involved ('000)—		
Directly	65.9	49.2
Indirectly (b)	7.0	1.4
Total	72.9	50.6
Number of working days lost ('000)	244.0	143.1

(a) Excludes disputes involving cessation of work of less than 10 man-days. (b) Persons put out of work at the establishments where the stoppages occurred, but not themselves parties to the dispute.

The statistics exclude disputes involving stoppages of work of less than ten man-days in the establishment where the stoppage occurred. Effects on the other establish-

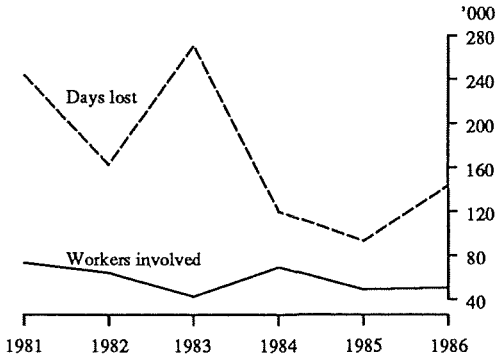
DIAGRAM 21.2
INDUSTRIAL DISPUTES



ments resulting from lack of materials, disruption of transport services, power cuts, etc. are not measured by these statistics.

Particulars of all disputes in progress during the year are included in the annual figures, whether the dispute commenced in that year or was in progress at the beginning of the year. Consequently, details of the 'number of disputes' and 'workers involved' in disputes which commenced in any year, and were still in progress during the following year, are included in the figures for both years.

DIAGRAM 21.3
INDUSTRIAL DISPUTES: NUMBERS OF WORKERS INVOLVED AND DAYS LOST



Particulars of some stoppages (e.g. those involving a large number of establishments) may be estimated and the statistics therefore should be regarded as giving a broad measure of the extent of stoppages of work (as defined).

The number of days lost peaked in 1983 at approximately 270,600, although there were both less disputes and less workers involved in that year. The construction industry had an increase in days lost of approximately 95,200 for 1983 but a decrease in the number of disputes from 33 to 12. The number of workers involved in disputes in the construction industry remained fairly steady throughout the period.

Disputes data comparing the four main industry groups (i.e. Mining, Manufacturing, Construction and Transport) and all other industries is contained in Diagrams 21.4 and 21.5.

WAGES AND EARNINGS

Determination of rates of pay

The awards and determinations of the various Federal and State tribunals prescribe minimum rates of pay, standard hours of work and other conditions of employment for particular occupations. Most awards also prescribe a minimum wage for adults, i.e., the minimum amount which must be paid to an adult employee, regardless of occupation, for working the standard weekly hours of work. The concept of equal pay for the sexes is applicable in most Federal and State awards. In recent years the wage-fixing principles of the Australian Conciliation and Arbitration Commission have generally been followed by State tribunals.

DIAGRAM 21.4
INDUSTRIAL DISPUTES: DAYS LOST BY INDUSTRY

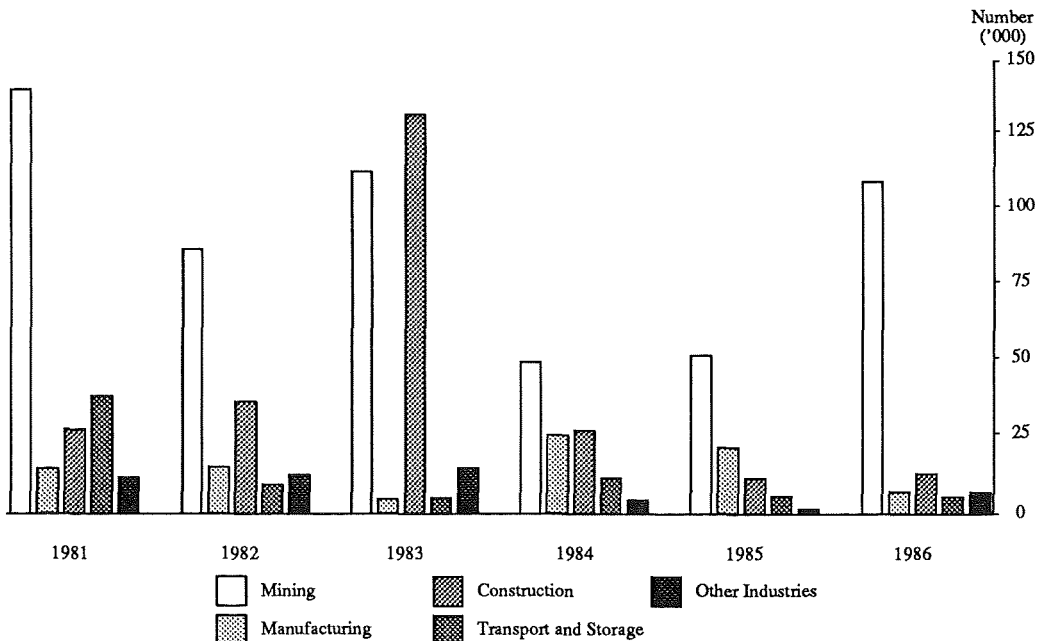
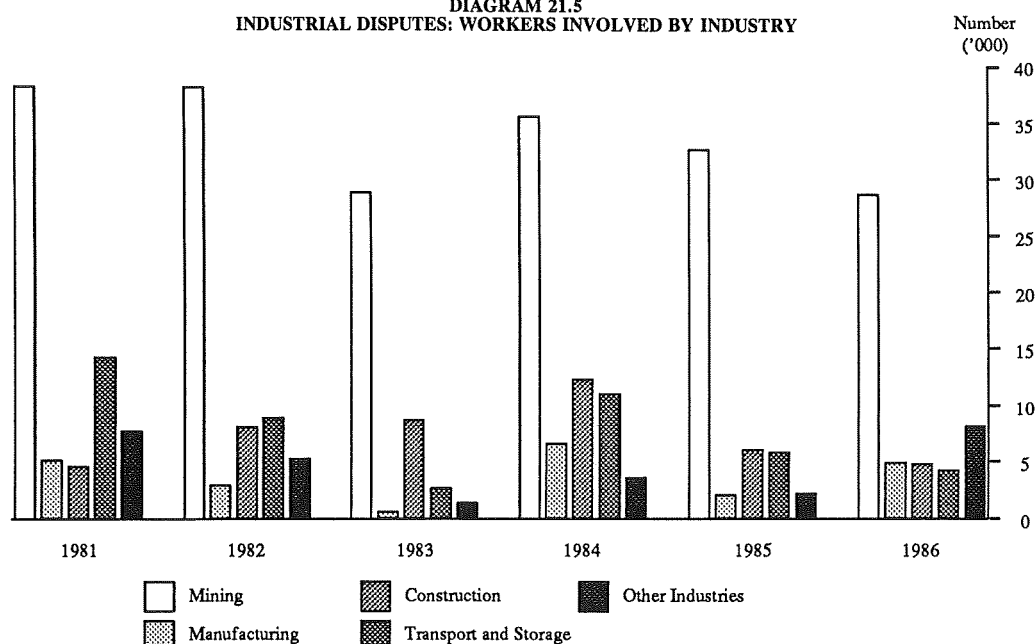


DIAGRAM 21.5
INDUSTRIAL DISPUTES: WORKERS INVOLVED BY INDUSTRY



Award rates of pay

The indexes shown in the following tables refer to Western Australia and relate to full-time adult wage and salary earners whose rates of pay are normally varied in accordance with awards or determinations made by Federal or State authorities or collective agreements registered with them. The indexes are designed to measure trends in rates payable under awards.

In the five years between June 1976 and June 1981 award rates for adult wage earners increased on average over all industries by 67 per cent. For particular industries the increases ranged from a maximum of 70.5 per cent for Transport and storage down to a minimum of 64.8 per cent for the Construction industry. In the following five years between June 1981 and June 1986 the average increase over all industries was 32 per cent, ranging from 42.2 per cent for Recreation, personal and other services, down to 25.8 per cent for the Mining industry.

TABLE 21.9 - INDEXES OF WEEKLY AWARD RATES OF PAY

(Base: Weighted average minimum weekly award rate, June 1976 100.0)

Industry	Wage and salary earners		Wage earners	
	1981	1986	1981	1986
Mining	*	211.4	167.5	210.8
Manufacturing	*	219.6	167.6	220.9
Electricity, gas and water	*	219.2	168.3	220.5
Construction	*	213.0	164.8	211.3
Wholesale trade	*	217.6	165.0	217.4
Retail trade	*	222.7	162.9	221.7
Transport and storage	*	214.5	170.5	218.2
Communication	*	217.3	165.1	223.3
Finance, property and business services	*	211.8	166.8	*
Public administration and defence (a)	*	215.4	168.1	224.4
Community services	*	218.2	168.3	229.5
Recreation, personal and other services	*	234.7	169.0	240.3
All industries (b)	*	217.7	167.0	220.5

(a) Excludes employees in the defence forces. (b) Excludes employees in the defence forces, agriculture, services to agriculture and employees in private households employing staff. * Subject to sampling variability too high for most practical uses.

Average weekly earnings

Statistics of average weekly earnings are produced quarterly, and are based on employment and earnings information obtained from a sample survey of employers. They

relate to earnings of employees in respect of a single pay period ending on or before a specific date near the middle of the quarter.

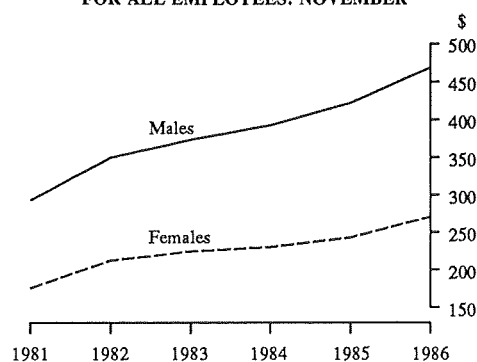
Earnings are gross earnings in a pay period, before taxation and any other deductions such as superannuation, board and lodging, etc. have been made. Earnings comprise ordinary time earnings, overtime earnings, shift allowances, plus other allowances, payments, commissions, etc.

TABLE 21.10 - AVERAGE WEEKLY EARNINGS OF EMPLOYEES NOVEMBER (\$)

Particulars	1981	1986	Percentage change
Males	291.90	468.30	60.4
Females	175.50	270.30	54.0
Persons	241.90	385.20	59.2

Diagram 21.7 shows average weekly earnings for all employees in Western Australia in November of each year from 1981 to 1986. Male average weekly total earnings in November 1986 were \$468.30, while those for females were \$270.30, a difference of 73.3 per cent. The difference between male and female average weekly total earnings in November 1981 was 66.3 per cent, males earning \$291.90 and females \$175.50.

DIAGRAM 21.6
AVERAGE WEEKLY EARNINGS
FOR ALL EMPLOYEES: NOVEMBER



HOURS OF WORK AND LEAVE PROVISIONS

Standard hours of work.

In the fixation of weekly wage rates most industrial tribunals prescribe the number of

hours constituting a full week's work for the wages specified.

TABLE 21.11 - EMPLOYED PERSONS
AVERAGE WEEKLY HOURS WORKED (a)
BY INDUSTRY: MAY 1986

Industry	Females			Total Persons
	Males	Married		
Agriculture, forestry, fishing and hunting	48.5	22.6	25.4	42.1
Agriculture and services to agriculture	50.3	23.0	25.7	43.1
Forestry and logging, fishing and hunting	36.1	12.4	18.0	33.7
Mining	37.3	38.6	36.2	37.2
Manufacturing	39.5	29.9	31.4	37.7
Food, beverage and tobacco	37.4	32.3	31.5	35.4
Metal products	40.6	32.4	31.3	39.4
Other manufacturing	39.5	28.5	31.4	37.6
Electricity, gas and water	36.7	20.3	21.8	35.3
Construction	41.1	17.4	22.6	38.2
Wholesale and retail trade	41.7	25.0	25.6	34.2
Wholesale trade	40.2	31.2	34.1	38.5
Retail trade	42.5	23.5	24.1	32.6
Transport and storage	38.7	24.5	26.1	36.4
Communication	33.8	29.7	30.4	33.2
Finance, property and business services	41.1	25.5	30.4	35.6
Public administration and defence	37.1	29.8	32.4	35.5
Community services	39.1	26.7	29.2	32.6
Recreation, personal and other services	41.5	26.5	28.3	33.9
All industries	40.6	25.9	28.2	35.7

(a) The estimates refer to actual hours worked, not hours paid for.

Since January 1948, practically all employees in Australia have had a standard working week of forty hours or less. However, the number of hours constituting a full week's work (excluding overtime) differs between occupations and Table 21.11 shows the average weekly hours worked during May 1986 for the major industry groups.

The average weekly hours worked by employees over all industries in May 1986 was 35.7 hours per week. For particular industries the average per employee ranged from a minimum of 32.6 hours per week in the Community services industry to a maximum of 43.1 hours per week in the Agriculture and services to agriculture industry.

Annual leave and long service leave.

As from 1 January 1973, employees of the Commonwealth Government and the State Government were granted four weeks paid annual leave, together with an annual leave

loading of 17.5 per cent of their weekly salary, up to a specified maximum amount. Subsequently, these entitlements were extended to most awards and agreements so that most employees now receive at least four weeks paid annual leave and an annual leave loading payment.

The *Long Service Leave Act 1958* (State) confers entitlement to long service leave with pay on employees for whom such leave is not otherwise provided. Entitlement accrues only in relation to continuous service with one employer, but continuity of service is not affected by the transfer of a business from one employer to another. Leave of thirteen weeks on ordinary pay is granted for the first fifteen years of service. For each subsequent ten years the entitlement is eight and two-thirds weeks, with *pro rata* conditions applying in the case of termination of employment for any reason other than serious misconduct.

The *Long Service Leave Act Amendment Act 1973*, which came into operation on 1 March 1974, provides that the 'standard' period of thirteen weeks leave after fifteen years service may be varied as the result of an agreement between the Confederation of Western Australian Industry (Incorporated) and the Trades and Labor Council of Western Australia or by a determination of the Western Australian Industrial Commission in Court Session.

WORKERS' COMPENSATION AND ASSISTANCE

The *Workers' Compensation and Assistance Act 1981* provides compensation for personal injury arising out of or in the course of employment, for death resulting from such injury, and for disease or the recurrence of a pre-existing disease where employment was a contributing factor. The provisions of the Act do not extend to employees of the Commonwealth Government for whom compensation is provided by the *Compensation (Commonwealth Government Employees) Act 1971*.

Every employer, other than a self insurer, is required to effect insurance with an approved insurer for the full amount of his liability to pay compensation under the Act to all workers in his employment.

The Workers' Compensation Board, constituted under the Act, has exclusive jurisdiction to examine, hear and determine all matters and questions arising out of claims for compensation under the Act and all questions as to the right or amount of indemnity. The Board's determinations are final and conclusive except that a party to any proceedings before the Board who is dissatisfied with a determination may appeal to the Full Court of the Supreme Court. Additionally, when a question of law arises in any proceedings before the Board, the Board may refer the question for the decision of the Full Court of the Supreme Court.

The functions of the Workers' Assistance Commission constituted under the Act include: participation in research into the causes, incidence and methods of prevention of accidents, injuries and diseases for which compensation may be payable; encouragement of the prevention or minimisation of accidents, injuries and diseases; co-ordination of rehabilitative, occupational or vocational training or remedial treatment for workers suffering injuries or disease; formulating recommendations and preparing estimates for submission to Parliament of the cost of providing facilities for rehabilitation and re-employment of workers sustaining permanent or temporary disablement from a compensable disability and making recommendations to the Minister on applications by insurers and employers to function as approved insurers or self-insurers under the Act.

The payments, allowances and benefits under the Act are calculated by reference to a 'prescribed amount' which is partially indexed annually on 1 July by the weighted average minimum award rate for adult males under Western Australian State Awards. At 1 July 1987 the prescribed amount was \$76,267.

The total liability of the employer weekly and lump sum payments is limited to \$76,267 except where the Board determines that a disability to a worker has resulted in his permanent total or permanent partial incapacity for work.

Additional monies are payable up to a maximum of 20 per cent of the prescribed amount, i.e. \$15,253 (or more, if the Board finds that in particular circumstances this

sum is inadequate) for expenses incurred for first aid and ambulance services, medicines, medical or surgical attendance, hospital treatment and the like. In the event of the death of the worker, payable funeral expenses are compensable up to a maximum of \$1,100.

Where death results from the disability and the worker leaves any adult dependants who are wholly dependant on the worker's earnings, a sum equal to 85 per cent of his residual entitlement is payable. However, payments to a wholly dependant mother or spouse are subject to a guaranteed minimum sum. A child's allowance is payable weekly up to the age of sixteen years (or twenty-one years in the case of a full-time student) in respect of any wholly dependant child.

Provisions also exist for partial dependants to receive compensation in proportion to the loss of necessary financial support suffered by such dependants.

INDUSTRIAL ACCIDENTS

The statistics shown in Table 21.12 represent all industrial accidents occurring during the year ended 30 June 1986 involving time lost from work of one day or more and are presented according to broad industry groups. For a particular year of record ended 30 June, reports of finalised cases are received progressively from insurers up to the end of September after which time reports are provided for unfinalised cases. The data are not comparable with those published in previous issues of the *Western Australian Year Book*.

The figures do not represent all industrial accidents which actually occurred in Western Australia during the year because:

- (i) in the case of non-fatal accidents, they include only those which resulted in absence from work for one day or more;
- (ii) only accidents coming within scope of the *Workers' Compensation and Assistance Act 1981* are included in the statistics, which therefore exclude industrial accidents resulting in the death of or injury to, self-employed persons and persons employed by the Commonwealth Government;
- (iii) the statistics include only accidents occurring at the work site or accidents occurring in the course of the worker's normal duties, and therefore do not include 'journey' cases or 'recess' cases (i.e. cases which occur during work breaks). During the year ended 30 June 1986, there were 1,639 claims for 'journey' cases and 63 claims for 'recess' cases;
- (iv) industrial disease cases are not included.

TABLE 21.12 - TOTAL ACCIDENTS—INDUSTRY DIVISION, TIME LOST AND COST OF CLAIMS: 1985-86

Industry	Number of		Total cost of claims (\$'000)(a)
	Accidents	Weeks lost(a)	
Agriculture, forestry, fishing and hunting	1,463	7,022	5,547
Mining	2,817	14,740	14,185
Manufacturing	8,350	29,149	24,153
Electricity, gas and water	1,004	6,139	6,093
Construction	3,793	19,262	17,525
Wholesale and retail trade	4,361	15,200	11,554
Transport and storage	2,107	10,646	9,094
Finance, property and business services	1,111	6,616	5,698
Public administration and defence	2,070	11,650	9,765
Community services	4,717	32,753	27,379
Recreation, personal and other services	1,432	7,921	6,701
Total	33,227	161,123	137,709

(a) Includes estimates for cases not finalised by October 1986.

REFERENCES

ABS publications

Labour Statistics (6101.0)

A Guide to Labour Statistics (6102.0)

The Labour Force, Australia (6202.0 and 6203.0)

Employed Wage and Salary Earners, Australia (6248.0)

Average Weekly Earnings, States and Australia (6302.0)

Average Earnings and Hours of Employees, Australia (6304.0)

Distribution and Composition of Earnings and Hours of Employees, Australia (6306.0)

Award Rates of Pay Indexes, Australia (6312.0)

Industrial Disputes, Australia (6321.0)

Trade Union Statistics, Australia (6323.0)

Industrial Accidents, Western Australia
(6301.5)

Other publications

Department of Employment and Training,
Annual Report 1985-86

Western Australian Industrial Relations
Commission, *Annual Report 1987*.

Chapter 22

PRICES AND HOUSEHOLD EXPENDITURE

'Average prices' of a limited range of commodities are recorded in the Blue Books of Western Australia from the early colonial years and in the Western Australian Year Book (Old Series) from 1886. Retail prices of food and groceries and average rentals of houses for years extending back to 1901 have been collected by the Australian Statistician but it was not until 1911 that a systematic collection of retail price statistics was begun.

RETAIL PRICES AND PRICE INDEXES

Information concerning the development of price indexes in Australia is given in *Year Book Australia* (Catalogue No. 1301.0) and *Labour Report* No. 58—1973 (Reference No. 6.7).

TABLE 22.1 - AVERAGE RETAIL PRICES OF
SELECTED ITEMS — PERTH
(cents)

		December quarter			
Item	Unit	1984	1985	1986	
<i>Dairy produce</i>					
Milk, carton, supermarket sales	1 litre	71	75	79	
Milk, powdered, full cream	1 kg can	429	444	451	
Cheese, processed, sliced, wrapped	500g	205	220	236	
Butter	500g	148	154	162	
<i>Cereal products</i>					
Bread, white loaf, sliced, supermarket sales	680g	95	102	101	
Biscuits, dry	250g	80	98	96	
Breakfast cereal, corn based	500g	154	170	185	
Flour, self-raising	2 kg	135	155	162	
Rice, medium grain	1 kg	78	77	94	
<i>Meat and seafoods</i>					
<i>Beef</i>					
Rib, without bone	1 kg	481	516	496	
Rump steak	1 kg	761	833	849	
T-bone steak, with fillet	1 kg	688	783	809	
Chuck steak	1 kg	482	533	521	
Silverside, corned	1 kg	467	515	542	
Sausages	1 kg	253	268	276	
<i>Lamb</i>					
Leg	1 kg	430	443	441	
Loin chops	1 kg	454	490	569	
Forequarter chops	1 kg	375	405	430	
<i>Pork</i>					
Leg	1 kg	529	558	527	
Loin chops	1 kg	545	583	614	
Chicken, frozen	1 kg	242	274	266	
Bacon, middle rashers	250g pkt	171	190	213	
Beef, corned	340g can	173	193	189	
Salmon, pink	210g can	134	170	209	
<i>Fresh fruit and vegetables</i>					
Oranges	1 kg	137	141	136	
Bananas	1 kg	153	128	173	

TABLE 22.1 - AVERAGE RETAIL PRICES OF
SELECTED ITEMS — PERTH
(cents)—continued

Item	Unit	December quarter			
		1984	1985	1986	
Potatoes	1 kg	65	70	83	
Tomatoes	1 kg	250	290	297	
Carrots	1 kg	60	72	74	
Onions	1 kg	101	65	111	
<i>Processed fruit and vegetables</i>					
Peaches	825g can	112	139	144	
Pineapple, sliced	450g can	68	74	77	
Peas, frozen	500g pkt	83	90	86	
<i>Confectionery</i>					
Chocolate, milk, block	200 g	139	147	163	
<i>Other food</i>					
Eggs	55g, 1 dozen	158	162	168	
Sugar, white	2 kg	129	134	153	
Jam, strawberry	500g jar	119	140	160	
Tea	250g	146	149	142	
Coffee, instant	150g jar	355	412	538	
Tomato sauce	600 ml	112	115	117	
Margarine, poly-unsaturated	500 g	120	136	123	
Baked beans, in tomato sauce	440 g	53	60	70	
Baby food	125g can	9	32	33	
<i>Household supplies and services</i>					
Laundry detergent	1 kg	273	313	326	
Dishwashing detergent	1 litre	217	365	337	
Facial tissues	pkt of 224	157	171	159	
Toilet paper	6 x 500 sheet rolls	242	253	268	
Pet food	415g	64	72	79	
<i>Private motoring</i>					
Petrol, super grade	1 litre	47.7	53.0	57.3	
<i>Alcoholic beverages</i>					
Beer, full strength, chilled	750 ml bottle	140	153	171	
Beer, full strength, unchilled	12 x 750 ml bottles	1,361	1,486	1,642	
Draught beer, full strength, public bar	285 ml glass	101	114	130	
Scotch, nip, public bar	30 ml	147	158	179	
<i>Personal care products</i>					
Toilet soap	2 x 125g	102	114	115	
Toothpaste	140g	135	158	177	

A selection of retail prices collected for use in the compilation of the Perth Consumer Price Index is shown in Table 22.1

The Consumer Price Index

The Consumer Price Index (CPI) measures quarterly price changes of a 'basket' of goods and services which represent a high proportion of expenditure by metropolitan wage and salary earner households. This 'basket' covers a wide range of goods and services, arranged in eight groups: Food; Clothing; Housing; Household equipment and operation; Transportation; Tobacco and alcohol; Health and personal care; and Recreation and education.

Index numbers are published for each of the eight capital cities at the group level. Indexes at the sub-group level and for selected expenditure classes are available on request.

Index Population. Because the spending patterns of various groups in the population differ somewhat, the pattern of one large group, fairly homogenous in its spending habits, is chosen for calculating the CPI. This population group is, in concept, *metropolitan employee households*. Employee households are defined as those households which obtain at least three-quarters of their total income from wages and salaries, excluding the top ten per cent (in terms of income) of such households. 'Metropolitan' means the six State capital cities, Canberra and Darwin.

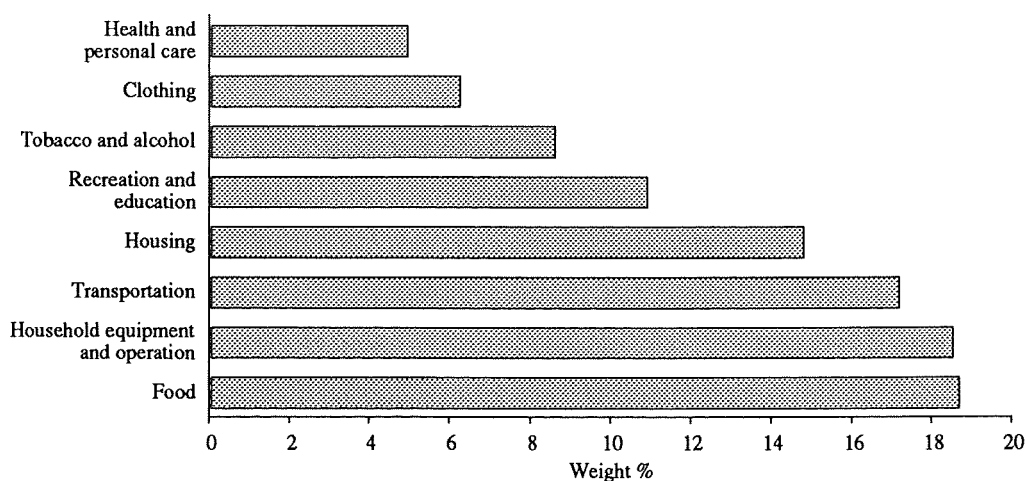
Weighting pattern. The composition and weighting pattern of the items in the CPI 'basket' reflect the expenditure pattern of the CPI population group, as derived from Household Expenditure Surveys and other supplementary data collected by the ABS.

Periodic reviews. Changes in the weighting pattern have been made at approximately five-yearly intervals to take account of changes in household spending patterns.

The eleventh series of the CPI began with the release of the March quarter 1987 CPI and incorporated the following changes: expenditure on the purchase of dwellings was replaced by expenditure on mortgage interest charges; interest on charges for consumer credit used for household purposes other than dwelling purchase was included; expenditure on optical services, veterinary services and watches and clocks was included; and the range of fresh fruit and vegetables included in the index was expanded.

Price collection. Price movements are monitored in the kinds of retail outlets or other establishments where metropolitan employee households would normally purchase goods and services. This involves collecting prices from many sources, including supermarkets, garages, dental surgeries, hairdressers and appropriate government authorities.

DIAGRAM 22.1
CPI GROUPS WEIGHTING PATTERN: PERTH
(Eleventh series)



Prices are generally collected quarterly. However, some important items are collected more frequently (e.g. bread, fish, fresh meat, fruit and vegetables) and a small number annually (e.g. seasonal clothing, local government rates and charges).

Further reading. For publications containing information relating to the current series of

the Consumer Price Index refer to the end of this Chapter.

Table 22.2 shows annual quarterly index numbers for each of the eight groups and the 'All Groups' for the Perth CPI for the last three financial years.

TABLE 22.2 - CONSUMER PRICE INDEX : PERTH
(Base year 1980-81 100)

	Food	Clothing	Housing	Household equipment and operation	Trans- portation	Tobacco and alcohol	Health and personal care	Recreation and education (a)	All groups
1984-85	136.2	128.8	131.6	134.7	142.8	153.2	125.7	115.1	136.1
1985-86	146.3	140.2	141.7	145.7	153.7	168.7	135.9	123.9	147.1
1986-87	157.1	154.4	154.7	159.0	172.3	188.1	156.0	135.7	161.8
Quarter—									
1984-85									
September	134.0	124.6	128.9	132.9	138.9	148.3	123.6	113.1	133.2
December	134.6	128.3	130.8	133.6	140.6	151.9	124.6	113.7	134.7
March	137.0	129.5	132.4	134.7	142.8	155.3	126.4	115.0	136.7
June	139.3	132.8	134.1	137.6	148.8	157.4	128.1	118.7	139.9
1985-86									
September	142.0	134.0	136.5	141.2	152.5	161.7	132.1	120.9	142.9
December	145.7	139.3	140.8	144.7	152.1	167.4	134.8	123.1	146.1
March	147.1	140.5	143.1	146.5	156.3	171.3	137.5	125.2	148.5
June	150.5	147.2	146.2	150.2	153.8	174.5	139.1	126.5	150.8
1986-87									
September	153.7	147.2	149.5	154.8	163.0	181.4	148.0	131.2	155.9
December	156.8	153.8	153.3	157.7	172.5	185.5	152.9	133.9	160.7
March	158.3	156.1	156.5	160.4	175.6	190.9	158.4	137.7	163.8
June	159.6	160.6	159.4	163.2	178.0	194.7	164.8	140.0	166.6

(a) New group index replacing former 'Recreation' group. Base: March quarter 1982 100.

WHOLESALE PRICES OF MATERIALS USED IN BUILDING

The Price Index of Materials used in Building other than House Building measures monthly changes in prices of selected materials used in the construction of buildings other than houses. The weights used in this index reflect the usage of materials in the construction of buildings commenced in the six State capital cities in the three years ended June 1977. The same weighting pattern is used for each of the six capital cities.

The Price Index of Materials used in House Building measures changes in prices of selected materials used in the construction of houses. For this index the weights reflect the usage of materials in detached single dwelling units constructed in the Perth Statistical Division.

For both of these indexes, prices are collected at the mid-point of each month from representative suppliers. In general the point of pricing is *delivered on site*, but in some cases it may be necessary to accept other pricing points, e.g. *supplied and fixed*.

Tables 22.3 and 22.4 show annual figures for Perth for these two indexes covering the last three years.

**TABLE 22.3 - PRICE INDEX OF MATERIALS USED IN
HOUSE BUILDING: PERTH — ALL GROUPS**
(Base year 1985-86 100)

Year	Index number
1984-85	93.4
1985-86	100.0
1986-87	106.7

TABLE 22.4 - PRICE INDEX OF MATERIALS USED IN BUILDING OTHER THAN HOUSE BUILDING : PERTH
(Base year 1979-80 100)

Materials	Index number		
	1984-85	1985-86	1986-87
Selected major building materials—			
Structural timber	171.7	180.5	187.9
Clay bricks	146.7	159.4	170.5
Ready mixed concrete	148.0	163.9	165.4
Precast concrete products	152.8	159.4	170.8
Galvanised steel decking, cladding, etc.	153.4	163.8	173.7
Structural steel	161.2	180.8	203.1
Reinforcing steel bar, fabric and mesh	145.5	154.9	168.2
Aluminium windows	146.7	158.5	195.4
Steel windows, doors, louvres, etc.	152.7	167.1	186.4
Builders' hardware	162.3	181.5	196.4
Sand, aggregate and filling	167.4	183.1	184.5
Carpet	148.3	171.7	195.0
Paint	147.3	160.4	169.4
Non-ferrous pipes	125.3	137.1	144.3
Special combinations of building materials—			
All electrical materials	159.7	179.6	201.6
All mechanical materials	154.9	177.0	197.3
All plumbing materials	152.0	162.2	175.0
All groups	153.2	168.1	183.9

OTHER PRICE INDEXES

In addition to the indexes already described, the ABS compiles prices indexes related to the prices of selected import and export commodities, copper materials, materials used in manufacturing industries and articles

produced by manufacturing industries. The Import Price Index is released on a quarterly basis while the other indexes are released monthly. These indexes are published on a national basis only. For further reference to these indexes see the *Year Book Australia* (ABS Catalogue No. 1301.0) and other references listed below.

HOUSEHOLD EXPENDITURE SURVEYS

During 1974-75 and 1975-76, the Australian Bureau of Statistics conducted two surveys in order to obtain information about the expenditure patterns of private households. The 1974-75 Survey was confined to a sample of households in the six State capital cities and Canberra, while the coverage of the 1975-76 Survey was extended to include other urban and rural regions. Apart from limited attempts in 1910-11 and 1913 to assess the spending patterns of Australian households, these surveys were the first official collections of household expenditure statistics conducted in this country.

A further Household Expenditure Survey was conducted by the Australian Bureau of Statistics in 1984. Coverage of this survey, as in 1975-76, included households in both urban and rural areas, except remote and sparsely settled areas.

TABLE 22.5 - HOUSEHOLD EXPENDITURE BY REGIONS:1984

Particulars	Perth	Urban regions (a)	Rural regions (b)	Western Australia
AVERAGE WEEKLY HOUSEHOLD EXPENDITURE (\$)				
Commodity or service—				
Current housing costs (selected dwelling) (c)	47.03	26.37	18.28	41.50
Fuel and power	10.61	10.26	7.79	10.37
Food and non-alcoholic beverages	69.07	71.39	64.00	69.18
Alcoholic beverages	12.51	16.78	11.79	13.24
Tobacco	5.78	8.12	6.73	6.27
Clothing and footwear	21.67	18.59	15.35	20.72
Household furnishings and footwear	28.46	32.15	18.90	28.54
Household services and operation	15.88	14.87	16.57	15.74
Medical care and health expenses	12.76	12.59	12.65	12.72
Transport	62.28	57.41	79.83	62.47
Recreation	45.79	52.74	36.70	46.50
Personal care	6.61	5.48	3.94	6.24
Miscellaneous commodities and services	25.25	31.61	27.10	26.52
Total commodity or service expenditure	363.70	358.37	319.61	360.01

TABLE 22.5 - HOUSEHOLD EXPENDITURE BY REGIONS:1984 — *continued*

<i>Particulars</i>	<i>Perth</i>	<i>Urban regions (a)</i>	<i>Rural regions (b)</i>	<i>Western Australia</i>
Selected other payments—				
Income tax	83.17	86.16	52.50	81.82
Mortgage payments—principal (selected dwelling)	8.20	3.48	*	7.09
Other capital housing costs	24.67	*	*	21.44
Superannuation and life insurance	12.07	10.57	6.76	11.47
HOUSEHOLD CHARACTERISTICS				
Average weekly household income (\$) (d)	452.08	470.24	411.29	452.87
Proportion of total income being(per cent)—				
Wages and salaries	73.4	69.5	55.8	71.7
Own business	6.8	13.8	21.3	8.9
Government pensions and benefits	11.0	11.3	9.4	11.0
Other	8.8	*5.4	*	8.4
Total	100.0	100.0	100.0	100.0
Average age of household head (years)	45.31	45.32	45.61	45.33
Average number of persons per household—				
Under 18 years	0.85	0.89	0.98	0.87
18 to 64 years	1.71	1.67	1.87	1.71
65 years and over	0.24	0.28	*0.19	0.24
Total	2.79	2.83	3.04	2.82
Proportion of households with nature of housing occupancy being (per cent)—				
Owned outright	31.7	33.5	47.3	33.0
Being bought	41.8	17.6	7.8	35.3
Renting—government	5.1	*15.4	*	6.9
Renting—private	17.9	26.2	*28.1	20.1
Occupied rent-free	3.4	*7.2	*	4.7
Total	100.0	100.0	100.0	100.0
Average number of employed persons in household	1.21	1.21	1.57	1.23
Proportion of households with family composition of the household being (per cent)—				
Married couple—				
Only	25.3	27.7	30.4	26.0
With dependent children only	28.7	31.3	23.1	28.9
Other	13.2	12.1	*23.1	13.6
Single parent one family household only	4.6	*4.4	*	4.3
Single person household	19.1	18.5	*15.8	18.8
Other (e)	9.2	*6.0	*	8.5
Total	100.0	100.0	100.0	100.0
Number of households in sample	892	140	52	1,084
Estimated total number in population (*000)—				
Households	341.1	82.0	27.8	450.9
Persons	952.8	232.4	84.5	1,269.7

(a) All towns and urban centres with a population of 500 persons or more (excluding the Perth Statistical Division). (b) All localities with a population of less than 500 persons. Remote areas with less than 0.06 dwellings per square kilometre were excluded from the survey. (c) Includes the interest component only of any housing loan repayments. Excluded are outright purchase, or deposit on, dwellings or land, and other payments of a capital nature. (d) Household income is the sum of the gross weekly income of all household members. (e) Includes married couple and single parent families living in multiple family households.

In obtaining statistics on the consumption expenditure of households the surveys have facilitated:

analysis of household expenditure and income patterns;

updating of the weighting patterns used to compile the Consumer Price Index;

examination of the effect of changes in the structure of pensions, benefits and taxes on the patterns of household consumption expenditure and the distribution of household income;

development of government policy and planning in respect of specific components

of expenditure (e.g. housing, health, transport);
 planning of private enterprise marketing development;
 improvement of estimates of private final consumption expenditure used in the National Accounts;
 updating expenditure data used in economic models such as IMPACT.

REFERENCES

ABS Publications

The Australian Consumer Price Index : Treatment of Home Ownership Costs (6441.0)

Consumer Price Index (6401.0)

Export Price Index (6405.0)

A Guide to the Consumer Price Index: Eleventh Series (6440.0)

Import Price Index (6414.0)

Labour Report No. 58, 1973

Price Index of Materials Used in House Building (6408.0)

Price Index of Materials Used in Other than House Building (6407.0)

Price Indexes of Articles Produced by Manufacturing Industry (6412.0)

Price Indexes of Copper Materials (6410.0)

Price Indexes of Materials Used in Manufacturing Industries (6411.0)

Review of the Consumer Price Index: Information Paper (6450.0)

Information Paper: 1984 Household Expenditure Survey (6527.0)

1984 Household Expenditure Survey, Australia: Summary of Results (6530.0)

1984 Household Expenditure Survey, Australia: Household Characteristics (6531.0)

1984 Household Expenditure Survey, Australia: Specific Commodities (6532.0)

1984 Household Expenditure Survey, Australia: Household Expenditure by States and Territories (6533.0)

1984 Household Expenditure Survey, Australia: The Impact of Government Taxation and Expenditure on Household Income (6537.0).

PUBLIC FINANCE

COMMONWEALTH-STATE FINANCIAL RELATIONS

For a historical description of Commonwealth-State financial relations, refer to Chapter 24 issue of the *Western Australian Year Book*, No. 24—1986.

Management of Commonwealth-State funding

The major institutions assisting in the management of Commonwealth funding to State and Northern Territory Governments are: the Premiers' Conference; the Commonwealth Grants Commission; and the Australian Loan Council.

Premiers' Conference. The annual Premiers' Conference determines the total amount of general revenue assistance and its distribution between each of the States and the Northern Territory. Although these payments are at the Commonwealth's discretion, they are subject to negotiation between the Commonwealth and States at the Conference.

Commonwealth Grants Commission. The Commonwealth Grants Commission was established in 1933 to recommend on applications made by States for special financial assistance grants under section 96 of the Constitution. Since 1982, as a result of arrangements agreed at Premiers' Conferences, no State has sought such a grant.

Since 1978, under the *States (Personal Income Tax Sharing) Act 1976*, a special division of the Commission has also been responsible for recommending the per capita relativities to be used for the allocation of general revenue grants among the States.

Australian Loan Council. The Loan Council was established under the Financial Agreement Act of 1928 with responsibility for determining the annual borrowing programs of the Commonwealth and State Governments, and the terms and conditions of loans to finance these programs. In 1936, the Gentlemen's Agreement extended the Loan Council's authority to include approval

of semi-government and local authorities' borrowings.

By the early 1980s the Loan Council had begun to exercise increasingly less influence under the Gentlemen's Agreement over total authority borrowings. Greater use of non-conventional financing techniques, such as finance leasing and similar forms of borrowing, were being employed, which were outside the scope of the Agreement. These developments culminated in the Gentlemen's Agreement being suspended at the June 1984 Loan Council meeting, and the Global Approach was adopted on a trial basis in 1984-85. The objective of the Global Approach was to broaden the scope of Loan Council oversight of authority borrowings by bringing within voluntarily agreed limits all forms of borrowings by Commonwealth, State and local authorities.

Commonwealth financial assistance

Commonwealth Government payments to the State and Northern Territory Governments may be classified under two major headings: general purpose payments and specific purpose payments, which may be further classified into those provided for recurrent outlays and those provided for capital outlays. Payments are made in the form of grants (non-repayable) or loans (repayable).

General purpose payments provide general budgetary assistance and the States and Northern Territory are free to determine the spending of these monies according to their own budgetary priorities. Specific purpose payments, however, are generally a means of meeting the objectives and priorities of Commonwealth Budget programs. They are, therefore, provided subject to certain conditions, for example, the Commonwealth specifying the purpose for which the funds may be spent; the States being required to contribute some specified amount of their own funds to the program to qualify for the assistance.

The following table shows a summary of Commonwealth general and specific purpose payments for Western Australia and Australia for 1985-86.

TABLE 23.1 - COMMONWEALTH GENERAL AND SPECIFIC PURPOSE PAYMENTS FOR WESTERN AUSTRALIA AND AUSTRALIA: 1985-86(a)
(\$ million)

(Source: Commonwealth Budget Paper No. 4.)

Payments	Western Australia	Australia
General purpose payments—		
Revenue	1,299.3	11,919.9
Capital	144.8	1,736.0
Total	1,444.0	13,655.9
Specific purpose payments—		
Revenue	541.8	5,743.3
Capital	313.2	2,648.8
Total	855.0	8,392.1
Total general and specific	2,299.0	22,048.0
General and specific purpose payments classified according to—		
Grants	2,202.6	20,892.7
Advances (loans)	96.4	1,155.3

(a) Excludes direct Commonwealth payments to local authorities.

General purpose revenue payments. General purpose revenue is paid in the form of grants. The arrangements for determining the level and distribution of these grants among the States and Northern Territory, in the triennium 1985-86 to 1987-88, were agreed to at the May 1985 Premiers' Conference. The main features of the arrangements are: the replacement of tax sharing grants with new financial assistance grants to the States, to apply for the three years ending 1987-88; the levels of these grants to be adjusted for movements in prices and a real growth factor, and distributed on the basis of per capita relativities recommended by the Commonwealth Grants Commission; and the continued provision of separate, identified health grants, adjusted on the same basis as the financial grants, with an expectation that these grants would be absorbed into the financial assistance grants from 1988-89. The arrangements to apply from 1988-89 will be decided at the 1988 Premiers' Conference. The following table shows the main components of the general purpose revenue assistance for Western Australia and Australia for the three years 1983-84 to 1985-86.

TABLE 23.2 - GENERAL PURPOSE REVENUE ASSISTANCE (a)
(\$ million)

(Source: Commonwealth Budget Paper No. 4)

Year	Western Australia	Australia
FINANCIAL ASSISTANCE GRANTS		
1983-84	999.3	8,962.7
1984-85	1,042.3	9,529.7
1985-86	1,123.0	10,343.0
IDENTIFIED HEALTH GRANTS		
1983-84	150.7	1,194.2
1984-85	162.0	1,400.8
1985-86	176.3	1,483.3
SPECIAL REVENUE ASSISTANCE		
1983-84	18.2	183.5
1984-85	20.3	51.3
1985-86	-	87.2
OTHER GRANTS AND ENTITLEMENTS		
1983-84	-	21.8
1984-85	-	-3.0
1985-86	-	6.4
TOTAL GENERAL REVENUE ASSISTANCE		
1983-84	1,168.1	10,362.1
1984-85	1,224.6	10,978.9
1985-86	1,299.3	11,919.9

(a) Excludes direct Commonwealth payments to local authorities.

General purpose capital payments. For 1985-86, the Loan Council approved a borrowing program of General Purpose Capital Funds for the States and Northern Territory of \$1,736m, of which \$1,117m comprised borrowings and \$619m capital grants. Western Australia's share amounted to \$144.8m, comprising \$51.6m in capital grants and \$93.1m in borrowings. Western Australia opted, under Loan Council provisions, to allocate the \$93.1m loan to public housing, thereby attaining a concessional interest rate.

Specific purpose payments. Specific purpose recurrent payments to Western Australia for 1985-86 amounted to \$541.8m. The major payments were for: schools \$110.3m; colleges of advanced education \$95.1m; universities \$93.9m; and Medicare \$89.1m. Specific purpose capital payments to Western Australia in 1985-86 amounted to \$313.2m. The largest amounts were allocated to: the Australian Land Transport Program, \$102.3m; the Australian Bicentennial Roads Development, \$55.8m; and public housing, \$46.2m.

Grants and advances. General and specific purpose payments are made in the form of grants or advances (loans). Tables 23.3 and

23.4 show grants and advances classified according to the Government Purpose Classification.

TABLE 23.3 - COMMONWEALTH GOVERNMENT GRANTS TO WESTERN AUSTRALIA BY
GOVERNMENT PURPOSE CLASSIFICATION
(\$ million)

Item	1983-84	1984-85	1985-86p
CURRENT GRANTS			
General public services, defence, public order and safety	0.3	7.3	8.6
Education—			
Primary and secondary education	94.1	103.6	113.9
Tertiary education—			
University education	79.2	85.2	93.9
Other higher education	78.1	85.3	95.1
Technical and further education	12.9	15.8	16.1
Pre-school education	4.9	4.9	2.4
Other education	2.8	2.9	3.0
Health—			
Hospitals and other institutional services and benefits	27.3	87.9	89.1
Clinic and other non-institutional services and benefits	1.2	1.3	1.5
Public health	7.6	8.5	9.8
Social security and welfare—			
Welfare services —			
Family and child welfare	1.8	1.3	1.3
Aged and handicapped welfare	1.4	3.0	3.7
Welfare services n.e.c.	1.5	3.6	5.8
Social security and welfare n.e.c.	1.8	2.0	2.1
Housing and community development—			
Housing	0.6	0.6	0.6
Community development	0.7	0.8	1.2
Recreation and culture	-	4.3	1.8
Fuel and energy	1.0	0.9	0.7
Agriculture, forestry, fishing and hunting—			
Agricultural land management	3.4	3.1	3.3
Other agriculture	0.3	0.6	7.4
Other economic affairs	31.8	32.0	23.2
Other purposes—			
General purpose inter-government transactions	1,216.6	1,275.7	1,354.1
Natural disaster relief	2.1	-	0.1
Total current grants	1,571.1	1,730.6	1,838.6
CAPITAL GRANTS			
Education—			
Primary and secondary education	18.4	22.1	22.2
Tertiary education—			
University education	5.8	5.4	6.7
Other higher education	3.5	3.6	5.4
Technical and further education	8.1	15.7	16.1
Other education	0.1	0.1	0.1
Health—			
Hospitals and other institutional services and benefits	-	-	4.3
Clinic and other non-institutional services and benefits	0.1	0.1	0.3
Public health	0.2	0.1	-
Social security and welfare—			
Welfare services—			
Family and child welfare	0.8	2.7	2.0
Aged and handicapped welfare	0.7	0.9	0.4
Housing and community amenities—			
Housing	37.7	57.7	60.2
Community development	3.2	3.8	4.0
Community amenities	12.8	6.8	0.4
Recreation and culture	0.4	1.0	18.8
Agriculture, forestry, fishing and hunting—			
Agricultural water resources management	3.5	3.0	2.5
Other agriculture	-	6.1	-

TABLE 23.3 - COMMONWEALTH GOVERNMENT GRANTS TO WESTERN AUSTRALIA BY GOVERNMENT PURPOSE CLASSIFICATION—continued
(\$ million)

<i>Item</i>	<i>1983-84</i>	<i>1984-85</i>	<i>1985-86p</i>
Transport and communications—			
Road transport	142.9	154.0	158.1
Other transport and communications	-	-	9.8
Other purposes—			
General purpose inter-government transactions	45.3	48.3	51.6
Natural disaster relief	1.6	-	0.3
Total capital grants	285.2	331.4	367.5

TABLE 23.4 - COMMONWEALTH GOVERNMENT ADVANCES TO WESTERN AUSTRALIA CLASSIFIED BY GOVERNMENT PURPOSE CLASSIFICATION
(\$ million)

<i>Item</i>	<i>1983-84</i>	<i>1984-85</i>	<i>1985-86p</i>
Net advances (a)—			
Defence	0.1	-0.1	-
Housing and community amenities—			
Housing	16.0	92.5	88.5
Community development	4.7	-11.0	-7.0
Water supply	-0.8	-0.8	-0.1
Sanitation and protection of the environment	-0.1	-0.2	-0.2
Agriculture, forestry, fishing and hunting—			
Agricultural water resources management	-0.2	-0.2	-0.2
Agricultural support schemes	5.9	1.8	-0.8
Forestry, fishing and hunting	-0.1	-0.1	-0.2
Transport and communications	-3.1	-3.1	-3.3
Other purposes—			
General purpose inter-government transactions	61.1	-23.6	-18.3
Natural disaster relief	0.1	-6.6	-6.5
Total net advances	83.4	48.6	51.8

(a) Gross advances less repayments.

COMMONWEALTH CASH BENEFITS TO PERSONS IN WESTERN AUSTRALIA

Commonwealth cash benefits to persons are paid from the National Welfare Fund which was established in 1943 by the National Welfare Fund Act. The main components of cash benefits are hospital, medical, pharmaceutical, sickness and unemployment benefits; family allowance; and sole parent, widows, age, invalid and repatriation pen-

sions. Other cash benefits include scholarships and payments to trainee teachers.

The following table gives details of all cash benefits paid during the three year period ended 30 June 1986. Cash benefits to or for persons in Western Australia increased from \$1,530.3m to \$1,891.4m over the period. In 1985-86, Social security and welfare amounted to \$1,516.5m or 80.2 per cent of the total cash benefits, followed by Health with \$315.4m or 16.7 per cent.

TABLE 23.5 - COMMONWEALTH GOVERNMENT CASH BENEFITS TO OR FOR PERSONS IN WESTERN AUSTRALIA CLASSIFIED BY GOVERNMENT PURPOSE CLASSIFICATION (a)
(\$ million)

Item	1983-84	1984-85	1985-86p
Education—			
Primary and secondary education	15.2	17.5	19.1
Tertiary education—			
University education	11.7	12.3	13.4
Other higher education	11.3	12.9	14.1
Technical and further education	5.3	5.9	6.6
Other tertiary education	4.0	4.7	5.8
Other education (including pre-school)	0.6	0.5	0.5
<i>Total education</i>	<i>48.2</i>	<i>53.8</i>	<i>59.5</i>
Health—			
Hospital and institutional services and benefits—			
Nursing home benefits	44.9	49.7	60.0
Hospital benefits re-insurance	-2.7	2.0	0.6
Clinical and non-institutional services and benefits—			
Medical benefits	109.5	171.0	194.1
Other	2.2	2.6	2.8
Public health benefits	2.4	2.6	4.0
Pharmaceutical benefits	35.7	49.2	53.9
<i>Total health</i>	<i>192.0</i>	<i>277.1</i>	<i>315.4</i>
Social security and welfare—			
Benefits to ex-servicemen and their dependents	160.7	186.2	211.7
Invalid and other permanent disabled benefits—			
Invalid pensions	107.0	133.7	155.5
Other	9.0	5.9	11.7
Old age pensions	400.4	428.5	450.2
Widows, deserted wives, divorcees and orphans benefits	63.4	69.6	72.9
Unemployed benefits	275.0	289.4	294.2
Sickness benefits	19.8	21.1	23.3
Sole parent benefits	94.3	114.4	134.0
Family and child benefits n.e.c.	140.5	142.2	147.5
Other social security and welfare benefits	13.2	18.4	15.5
<i>Total social security and welfare</i>	<i>1,283.1</i>	<i>1,409.4</i>	<i>1,516.5</i>
Other purposes	7.0	-	-
Total all cash benefits	1,530.3	1,740.3	1,891.4

(a) For conditions and rates applying see Chapter 7. Western Australia's allocation of some benefits has been estimated.

STATE GOVERNMENT FINANCE

The data in Tables 23.6 to 23.10 relate to the financial activities of the Government of Western Australia, statutory authorities, boards, commissions and corporations, and incorporated bodies (other than financial enterprises) in which the State Government or its agencies have a controlling interest.

The revised series is designed to provide, for the public sector, statistics which complement the accounts for individual sectors provided in the Australian National Accounts. These statistics are intended to consolidate the transactions of the various public authorities and present them so that their economic impact may be assessed; to show the purposes that are being served by government expenditures; and to show the roles of the various levels of government in

the undertaking and financing of these expenditures.

Basic principles which have been followed in developing the data for the economic accounts for the public sector are that all public authorities should be included; all funds under the control of those authorities should be analysed; and transfers between funds, accounts and authorities should be eliminated to present tables on a consolidated basis.

In this section of the Year Book the public sector has been taken to comprise general government bodies (excluding local government authorities) and public trading enterprises. Public financial enterprises have been omitted from the consolidated accounts presented here, largely on the ground that combining the income and outlay and capital financing transactions of publicly-owned

trading and savings banks, government insurance offices and other public financial institutions with the equivalent transactions of public trading enterprises and general government seems to provide a less meaningful account of public sector activity.

General government bodies are government departments, offices, agencies and authorities engaged in providing services free of charge or at prices significantly below their cost of production.

Public trading enterprises are government undertakings which aim at covering the bulk of their expenses by revenue from sales of goods and services.

Over recent years a range of new and revised classifications has been developed for use in the compilation and presentation of government finance statistics. For details of the new classifications refer to the *Classification Manual of Government Finance Statistics* (Catalogue No. 1217.0). Two of the main classifications shown in

that publication are the Economic Transactions Framework and the Government Purpose Classification.

The Economic Transactions Framework, in broad terms, is designed to categorise transactions between public authorities and the private sector, and between public authorities where sub-sectors of the public sector have been identified, in a way which facilitates a study of the impact of government transactions on the economy.

The Government Purpose Classification scheme is the medium by which outlays with similar objectives are brought together to reveal more fully the broad purposes of public sector spending, and to provide a framework for developing means of assessment of the effectiveness of outlays in achieving government policies. With the classification of outlays by economic type, the purpose classification also facilitates the assessment of the economic impact of identified programs of expenditure.

TABLE 23.6 - STATE AUTHORITIES—RECEIPTS AND FINANCING TRANSACTIONS
CLASSIFIED BY ECONOMIC TRANSACTIONS FRAMEWORK
(\$ million)

Item	1983-84	1984-85	1985-86p
Revenue and grants received—			
Taxes, fees, fines	752.3	869.8	933.6
Net operating surpluses of public trading enterprises	273.1	297.8	400.7
Property income—			
Income from public financial enterprises	9.7	11.7	26.9
Interest received	90.2	126.9	168.4
Other property income	197.2	178.2	217.0
Other revenue	38.6	53.5	58.9
Grants received from the Commonwealth—			
Current grants	1,577.3	1,727.9	1,838.7
Capital grants	285.2	331.0	363.9
<i>Total revenue and grants received</i>	<i>3,223.7</i>	<i>3,596.7</i>	<i>4,008.1</i>
Financing transactions—			
Advances received	88.2	55.2	47.9
Net borrowing—			
General government	229.3	257.5	247.6
Public trading enterprises	445.8	299.1	358.2
Deposits received (net)—			
Increase in cash balance of private trust funds	30.1	-40.8	-41.0
Decrease in investments	22.6	-9.4	1.7
Decrease in currency and deposits	-152.0	-161.1	-62.0
Increase in provisions—			
For depreciation	92.6	112.5	109.4
Other	37.4	42.6	72.5
Other funds available (net) including errors and omissions	51.5	33.3	-77.2
<i>Total financing transactions</i>	<i>845.5</i>	<i>588.8</i>	<i>657.0</i>
Total funds available	4,069.2	4,185.5	4,665.1

Table 23.6 shows that the main components of the receipts of Western Australian State authorities are taxation, grants from the Commonwealth Government, and financing transactions. Further details of taxation collections by State authorities and local government authorities are given later in this Chapter.

Figures for some items published in the public authority finance series may differ from issue to issue as a consequence of reclassification of items and other improvements made in the course of developing the most appropriate presentation of the financial transactions of public authorities.

Financing transactions are the means by which governments finance their deficits or

invest their surpluses, and include transactions in securities of all types, borrowing, trade credit of public trading enterprises, and changes in bank balances. Financing transactions represent the difference between total revenue and grants received and total outlays.

The following table shows current and capital outlays by Western Australian State authorities classified by Economic Transaction Framework. The principal components, for current outlays, are general government final consumption expenditure and current transfer payments; and for capital outlays, capital expenditure on goods, capital transfer payments, and net advances.

**TABLE 23.7 - STATE AUTHORITIES—OUTLAYS
CLASSIFIED BY ECONOMIC TRANSACTIONS FRAMEWORK
(\$ million)**

<i>Item</i>	<i>1983-84</i>	<i>1984-85</i>	<i>1985-86p</i>
Current outlays—			
General government final consumption expenditure	1,937.1	2,138.8	2,384.5
Transfer payments—			
Interest paid—			
On Commonwealth advances	199.9	203.5	210.5
Other	283.9	386.4	472.8
Subsidies paid—			
To public trading enterprises	162.4	147.9	180.4
Other enterprises	14.9	16.9	22.7
Personal benefit payments	24.8	28.0	33.9
Grants—			
To non-profit institutions	127.9	146.8	159.3
To local government authorities	70.4	73.2	76.4
<i>Total, current transfer payments</i>	<i>1,768.4</i>	<i>1,002.6</i>	<i>1,156.2</i>
Total current outlays	2,821.3	3,141.5	3,540.6
Capital outlays—			
Gross fixed capital expenditure—			
On new fixed assets	1,150.6	973.2	1,029.3
On secondhand fixed assets (net)	-28.3	-33.2	-39.0
Increase in stocks	4.9	-3.2	25.0
Expenditure on land and intangible assets (net)	5.6	20.3	-32.6
<i>Total capital expenditure</i>	<i>1,132.8</i>	<i>957.1</i>	<i>982.7</i>
Transfer payments—			
Grants—			
To private sector and public financial enterprises	4.6	10.9	6.4
To local government authorities	47.2	52.9	57.4
<i>Total capital transfer payments</i>	<i>51.8</i>	<i>63.8</i>	<i>63.8</i>
Net advances paid—			
To public financial enterprises	-	-0.4	-11.6
To private sector	63.3	23.7	89.6
To local government authorities	0.1	-	-
<i>Total net advances paid</i>	<i>63.4</i>	<i>23.2</i>	<i>78.0</i>
Total capital outlays	1,247.9	1,044.1	1,124.5
TOTAL OUTLAYS	4,069.2	4,185.6	4,665.1

General government final consumption expenditure refers to expenditure by general

government bodies which does not result in the creation of fixed tangible assets or in

the acquisition of land, buildings or second-hand goods. It comprises expenditure on wages, salaries and supplements, and on goods and services other than fixed assets or stock. Fees, etc. charged by general government bodies for goods sold and services rendered are offset against purchases. Net expenditure overseas by general government bodies and purchases from public enterprises are included. All expenditure on defence is classified as general government final consumption expenditure.

Current transfer payments include such items as interest payments on public loans, personal benefit payments (e.g. age pensions), subsidies paid by general government to public and private enterprises, and grants, for non-capital purposes, to local authorities and private non-profit organisations (e.g. charitable organisations).

Capital expenditure refers to expenditure on new fixed assets whether for additions or replacements, including wages and salaries paid in connection with capital works. The acquisition and disposal of secondhand fixed assets, land and intangible assets and changes in the balance of stock accounts are included. Expenditure on new fixed assets for defence purposes is excluded. Because it has not been possible to make a satisfactory dissection, all expenditure on roads, including maintenance, is classified as capital.

Capital transfer payments consist mainly of grants to local governments, to public and private enterprises and persons for the purpose of acquiring capital assets.

Net advances. Advances are the creation of financial assets with the aim of funding particular enterprises, households or government activities. Repayments are offset against gross advances to give net advances. These advances are included in outlays, rather than financing transactions (refer to the definition on page 249) in order to bring together all the methods governments use to achieve expenditure policies. For example, advances are made to fund State housing projects.

LOCAL GOVERNMENT FINANCE

The financial powers of local government authorities in Western Australia are derived principally from the *Local Government Act 1960*, the main provisions of which are outlined in Chapter 5 — *Constitution and Government*.

Receipts and Payments

The following table summarises the receipts and payments (including loan transactions) of local government authorities for the financial years 1983-84 to 1985-86. Amounts have been shown on a gross basis wherever practicable.

TABLE 23.8 - SUMMARY OF LOCAL GOVERNMENT RECEIPTS AND PAYMENTS
(\$ million)

Item	1983-84	1984-85	1985-86p
Receipts—			
Rates (including penalties)	167.5	188.3	208.5
Fees and fines	5.3	6.1	6.8
Household garbage charges	18.2	20.7	23.8
Government grants—			
General purpose grants	44.6	46.7	51.4
Specific purpose grants	75.8	93.2	94.8
Reimbursements received—			
Roads and bridges (a)	10.3	11.1	10.1
Other reimbursements	5.6	9.3	15.1
Other revenue (b)	79.3	91.7	118.8
Total receipts	406.6	467.0	529.3
Loans raised during the year	38.6	47.4	41.4

TABLE 23.8 - SUMMARY OF LOCAL GOVERNMENT RECEIPTS AND PAYMENTS—*continued*
(\$ million)

Item	1983-84	1984-85	1985-86p
Payments—			
Payments for goods, services and land—			
General public services	46.6	52.1	56.2
Public order and safety	5.0	5.3	6.2
Education	0.3	0.3	0.3
Health	9.1	9.4	10.3
Welfare	8.4	10.4	11.9
Housing and community amenities—			
Household and other garbage	31.0	33.0	40.0
Community and regional development	7.8	7.4	10.8
Other housing and community amenities	16.3	19.1	24.5
Recreation and culture—			
Public halls, civic centres	7.8	7.9	10.6
Recreation and sport	67.2	75.2	85.7
Libraries and other culture	12.4	17.4	19.4
Economic services—			
Transport—			
Construction, maintenance of roads/bridges	108.2	126.0	130.7
Road plant purchases	13.9	17.7	18.6
Other transport	11.4	14.3	15.7
Other economic services	3.6	6.1	6.2
Other payments for goods, services and land	10.1	12.6	24.6
Total payments for goods, services and land	359.2	414.2	471.8
Comprising—			
Recurrent payment	217.9	243.4	278.7
Capital payment	141.3	170.8	193.1
Other payments from revenue—Debt charges (c)	64.0	68.9	76.8

(a) Mainly reimbursements from the Main Roads Department for work performed on its behalf and from private developers for sub-divisional roads. (b) Includes debt charges in respect of loans raised on behalf of State Government authorities. (c) Repayment of all loans.

Loan transactions

Under the provisions of local government legislation, local government authorities are constituted as corporate bodies and are authorised to raise loans for works and undertakings and for the liquidation of existing loan debts. The conditions imposed by the *Local Government Act 1960* in relation to loan raising, the levying of loan rates, the expenditure of loan monies and the repayment of loans are summarised in the section *The Local Government System* in Chapter 5 under the heading *Financial Provisions*.

Loans are raised mainly from banks, insurance companies and superannuation funds. The State Government exercises a measure of supervision over the loan transactions of local government authorities and, where a loan is repayable in full at maturity, maintains the necessary sinking fund at the Treasury.

Table 23.9 shows the aggregate debt outstanding at 30 June of each year from 1984 to 1986 in respect of all local authorities constituted under the Local Government Act. Figures are on a gross borrowing basis as they include all transactions associated

with borrowing by one level of government on behalf of another, and borrowing between levels of government.

TABLE 23.9 - LOCAL AUTHORITIES: DEBT
(\$ million)

Item	At 30 June		
	1984	1985	1986
Advances from public authorities	0.7	0.2	0.2
Loans	304.6	315.6	324.0
Other indebtedness	0.2	0.1	-
Debt outstanding	305.5	316.0	324.3

STATE GOVERNMENT AND LOCAL AUTHORITY TAXATION

The principal sources of State Government and local authority taxes, fees and fines in 1985-86 were: employers' payroll taxes 21.6 per cent, municipal rates 18.0 per cent, stamp duties 12.7 per cent and vehicle registration fees and fines 7.3 per cent. The following table shows, for the three years 1983-84 to 1985-86, taxes, fees and fines collected by State Government and local authorities.

TABLE 23.10 - STATE AND LOCAL AUTHORITIES: TAXES, FEES AND FINES BY TYPE
(\$ million)

<i>Item</i>	<i>1983-84</i>	<i>1984-85</i>	<i>1985-86p</i>
Taxes, fees and fines—			
Employers' payroll taxes	210.1	230.2	247.7
Taxes on property—			
Taxes on immovable property—			
Land taxes	42.4	49.6	51.7
Municipal rates	165.9	186.1	206.1
Metropolitan improvement rates	7.0	7.9	7.8
Taxes on immovable property n.e.c.	0.3	0.4	0.4
Estate inheritance and gift duty	0.5	0.1	-
Taxes on financial and capital transactions—			
Stamp duties	109.3	131.5	145.2
Financial institutions' taxes	16.5	34.9	27.0
Taxes on provision of goods and services—			
Excises (levies on statutory corporations)	19.8	22.6	28.7
Taxes on gambling—			
Taxes on government lotteries	21.2	24.1	20.5
Casino taxes	-	-	4.6
Race betting taxes	24.3	26.6	28.2
Taxes on gambling n.e.c.	-	1.0	0.9
Taxes on insurance—			
Insurance companies' contributions to fire brigades	20.4	22.1	23.6
Third party insurance taxes	4.1	4.2	4.5
Taxes on insurance n.e.c.	19.7	23.1	25.8
Taxes on use of goods and performance of activities—			
Motor vehicle taxes—			
Vehicle registration fees and taxes	72.7	78.4	84.2
Stamp duty on vehicle registration	29.9	44.5	48.9
Drivers' licences	11.7	15.2	13.9
Road transport and maintenance taxes	2.2	2.6	2.6
Franchise taxes—			
Petroleum products franchise taxes	41.2	44.0	46.0
Tobacco franchise taxes	46.7	49.6	57.0
Liquor franchise taxes	23.6	24.3	28.6
Fees and fines—			
Fees from regulatory services	15.3	18.6	21.8
Fines	18.4	20.5	20.9
Total taxes, fees and fines	923.5	1,062.0	1,146.7

REFERENCES

ABS publications

Classification Manual of Government Finance Statistics (1217.0)

Local Government, Western Australia (1303.5)

Government Financial Estimates, Australia (5501.0)

Commonwealth Government Finance (5502.0)

State and Local Government Finance, Australia (5504.0)

Taxation Revenue, Australia (5506.0)

Expenditure on Education, Australia (5510.0)

Chapter 24

PRIVATE FINANCE

The operations of the financial sector in Western Australia are controlled by both Commonwealth and Western Australian legislation.

The principal Australian legislation comprises the *Banking Act 1959*, *Reserve Bank Act 1959*, *Commonwealth Banks Act 1959*, *Life Insurance Act 1945* and the *Insurance Act 1973*. More detailed descriptions of the background and purpose of these Acts may be found in the *Year Book Australia*, No. 70—1986 from page 510 (Catalogue No. 1301.0).

In addition, the Financial Corporations Act was introduced in 1974 as a result of the increasing significance of the non-bank financial institutions in the early 1970s. The Government's aim in introducing this legislation was to regulate the activities of these non-bank institutions in order to achieve economic stability, maintenance of full employment, the efficient allocation of productive resources and to ensure adequate levels of finance for housing.

Recent Australian Governments, however, have sought to decrease the degree of regulation previously imposed on the financial sector and on banking activity in particular. As a result, controls on most bank interest and foreign exchange have been relaxed and new private banks (including overseas banks) have been permitted to commence operations.

State legislation exists to regulate the activities and monitor the solvency of particular types of financial institutions which operate on a co-operative basis and lend predominantly to members or consumers. In general, these institutions are permanent building societies, co-operative housing societies and credit unions. In some States, including Western Australia, there is also legislation for State Government bodies to operate as banks or insurance offices.

CURRENCY

Australia has a decimal system of currency, the unit being the dollar which is divided

into 100 cents. Australian notes are issued in the denominations of 2, 5, 10, 20, 50 and 100 dollars and coins in the denominations of 1, 2, 5, 10, 20, and 50 cents and 1 dollar. The 2 dollar note will be replaced by a 2 dollar coin in 1988.

BANKING

The banking system in Western Australia includes the Commonwealth banking institutions, The Rural and Industries Bank of Western Australia and the private trading and savings banks, summary details of which are given below.

Trading banks

Commercial banking is conducted by trading banks and in Western Australia eighteen such banks had outstanding advances at 30 June 1987.

Table 24.1 contains further details of these banks.

TABLE 24.1 - TRADING BANKS AT JUNE 1987
(\$'000)

Name	Deposits repayable in Australia (a)	Loans, advances and bills discounted (a)
Australian and New Zealand Banking Group Limited	649,809	575,017
Australian Bank Limited	-	6,145
Bank of America Australia Limited	8,819	38,950
Bank of New Zealand	40,014	53,625
Bankers Trust Australia Limited	200	-
Banque Nationale de Paris	9,818	31,506
Chase A.M.P. Bank Limited	9,815	3,697
Citibank Limited	560	17,235
Commonwealth Bank of Australia	599,689	586,998
Hong Kong Bank of Australia	9,310	20,927
I.B.J. Australia Bank Limited	4,782	41,196
Lloyds Bank N.Z.A. Limited	195	13,027
National Australia Bank Limited	647,698	733,632
National Mutual Royal Bank Limited	2,064	650
Nat West Australia Bank Limited	89,612	119,218
Standard Chartered Bank		

**TABLE 24.1 - TRADING BANKS
AT JUNE 1987 — continued
(\$'000)**

Name	Deposits repayable in Australia (a)	Loans, advances and bills discounted (a)
Australia Limited	32,032	91,188
The Rural and Industries Bank of Western Australia (General Banking Division)	2,098,030	1,730,170
Westpac Banking Corporation	1,162,377	887,464
Total	5,364,822	4,950,644

(a) Average of weekly balances for June 1987.

Table 24.2 shows the averages of deposits and advances for trading banks for the month of June.

**TABLE 24.2 - TRADING BANKS—MONTHLY
AVERAGES OF DEPOSITORS' BALANCES AND BANK
ADVANCES (a)
(\$'000)**

Particulars	June 1985	June 1986	June 1987
Depositors' balances— Commonwealth and State Government— Fixed	242,467	31,058	36,662
Current— Bearing interest	981	2,307	3,321
Not bearing interest	3,790	2,628	2,208
Other than Commonwealth and State Government— Fixed	2,525,385	3,471,737	3,878,293
Current— Bearing interest	269,344	221,943	392,873
Not bearing interest	909,656	1,026,185	1,051,465
Total	3,951,622	4,755,859	5,364,822
Loans, advances and bills discounted (b)	3,770,378	4,176,940	4,950,644
Ratio of loans, advances, etc. to total balances (per cent)	95.4	87.8	92.3

(a) Averages based on amounts at close of business each Wednesday. (b) Excludes loans to authorised dealers in the short-term money market.

Savings banks

At 30 June 1987 nine savings banks were operating in Western Australia. The value of depositors' balances at the end of June 1987 is shown in Table 24.3, while Table 24.4 shows total transactions classified by transaction type for these banks.

**TABLE 24.3 - SAVINGS BANKS AT 30 JUNE 1987
(\$'000)**

Name	Depositors' balances at end of June
Australia and New Zealand Savings Bank Limited	310,591
Bank of New Zealand Savings Bank Limited	511
Challenge Bank Limited	1,051,210
Citibank Savings Limited	7,544
Commonwealth Savings Bank of Australia	896,820
National Australia Savings Bank Limited	359,785
National Mutual Royal Savings Bank Limited	13,447
The Rural and Industries Bank of Western Australia (Savings Division)	729,568
Westpac Banking Corporation Savings Bank Limited	605,857
Total	3,975,333

TABLE 24.4 - SAVINGS BANK TRANSACTIONS

Particulars	Unit	1984-85	1985-86	1986-87(a)
Deposits (b)	\$'000	7,023,296	9,133,303	11,454,629
Withdrawals (b)	\$'000	7,010,082	9,095,499	11,383,020
Excess of deposits over withdrawals	\$'000	13,214	37,804	71,609
Interest added to accounts	\$'000	175,241	209,311	271,822
Accounts open at end of year (c)	No.	2,051,681	2,153,457	2,618,596
Depositors' balances at end of year— Total	\$'000	2,402,828	2,649,943	3,975,333
Average per operative account	\$	1,171	1,231	1,518
Average per head of estimated resident population	\$	1,738	1,864	2,725

(a) Includes figures for the Challenge Bank Ltd which commenced operations as a bank in April 1987. (b) Includes inter-branch transfers. (c) Excluding inoperative accounts (i.e. accounts of less than \$2 which have not been operated on for more than two years).

State bank

The Rural and Industries Bank of Western Australia is owned by the Western Australian Government. The bank has an office in Sydney, which handles wholesale business, branches in London and the Cayman Islands, and a representative office in Tokyo. It is also authorised to deal in foreign exchange under the Banking (foreign exchange) Regulations and to operate a full foreign exchange dealing room in Perth.

Other banks (excluding merchant banks)

Other banks operating in Western Australia comprise the Commonwealth Development Bank of Australia, which provides finance

for the purpose of primary production, and for the establishment or development of small business undertakings where finance is not otherwise available on reasonable and suitable terms and conditions; the Australian Resources Development Bank Limited, which assists Australian enterprises to participate in the development of Australia's natural resources; and the Primary Industry Bank of Australia Limited, which provides loans to primary producers for longer terms than are otherwise generally available but which is restricted to refinancing loans made by banks and other financial institutions.

BUILDING SOCIETIES

TABLE 24.5 - BUILDING SOCIETIES

Particulars	1983-84	1984-85	1985-86
PERMANENT SOCIETIES			
Number of societies	8	8	8
	\$'000	\$'000	\$'000
Liabilities—			
Withdrawable shares	1,374,872	1,463,808	1,534,979
Borrowings (a)	861,647	908,036	1,058,426
Other	108,960	96,826	109,383
Total liabilities	2,345,479	2,468,670	2,702,788
Assets—			
Amount owing on loans	1,664,158	1,807,865	1,977,938
Placements and deposits	44,805	(b)177,213	162,470
Other	636,516	(b)483,592	562,380
Total assets	2,345,479	2,468,670	2,702,788
Expenditure	310,239	299,846	364,896
Income	329,522	318,007	376,585
TERMINATING SOCIETIES			
Number of societies	220	215	203
	\$'000	\$'000	\$'000
Liabilities—			
Loans—			
Banks	32,476	36,809	41,195
Government	116,845	131,878	147,993
Other	23,167	24,128	28,466
Other liabilities	3,134	3,646	4,376
Total liabilities	175,621	196,460	222,031
Assets—			
Amount owing on loans	150,705	167,042	190,233
Other	24,916	29,417	31,797
Total assets	175,621	196,460	222,031
Expenditure	15,380	16,623	19,931
Income	15,757	17,090	20,627

(a) Previously known as deposits. (b) Previous series not comparable—negotiable certificates of deposits now included in 'Placements and deposits' instead of 'Other'.

Building societies in Western Australia are registered under the provisions of the *Building Societies Act 1976*, primarily for the purpose of raising funds to assist members

by granting loans, secured on mortgage, to build or acquire homes.

As shown by Table 24.5 permanent building societies obtain the majority of their funds from the public, while terminating societies derive funds primarily from government and banks. The Commonwealth Government contributes to these funds under the *Housing Assistance Act 1984*.

CREDIT UNIONS

Credit unions are registered in Western Australia under the *Credit Union Act 1979*. They operate on a co-operative basis by predominantly borrowing from and providing finance to their own members.

TABLE 24.6 - CREDIT UNIONS

Particulars	1983-84	1984-85	1985-86
Credit unions on register (a)	33	31	26
Number of members	173,123	194,819	201,669
	\$'000	\$'000	\$'000
Income—			
Interest on loans		76,949	118,449
Income from placements and other deposits (b)	58,050	7,017	9,817
Income from securities	1,848	3,957	3,791
Other income	4,920	5,888	6,183
Total	64,818	93,810	138,241
Expenditure—			
Interest on borrowings	40,535	61,301	98,311
Wages, salaries, etc.	9,065	10,387	13,362
Other administrative expenses (c)	7,933	11,555	13,065
Other expenditure	4,853	6,079	6,841
Total	62,384	89,322	131,581
Liabilities—			
Members' funds—			
Share capital	1,329	1,474	1,551
Deposits	448,433	668,130	900,045
Other liabilities	25,096	36,432	52,909
Total	474,857	706,035	954,505
Assets—			
Loans to members	362,926	581,218	788,827
Other	111,931	124,818	165,677
Total	474,857	706,035	954,505

(a) At 30 June. (b) Includes interest on deposits with banks. (c) Includes bad debts written off and allowances for doubtful debts.

FINANCE COMPANIES

Finance companies are defined as incorporated companies mainly engaged in providing to the general public (business as well as persons) any of the following types of credit facilities: instalment credit for retail

sales; personal loans; wholesale finance; factoring; other consumer and commercial loans; finance leasing of business plant and equipment and bills of exchange transactions.

Major assets, at 30 June in each year, derived from operations of finance companies in Western Australia are shown in Table 24.7.

**TABLE 24.7 - FINANCE COMPANIES
FINANCE LEASE RECEIVABLES AND LOAN
OUTSTANDINGS AS AT 30 JUNE
(\$ million)**

Particulars	1985	1986	1987
Finance lease receivables (a)	598.2	664.9	668.5
Loans outstanding—			
Individuals for housing	137.1	129.4	98.6
Individuals for other uses	606.4	663.2	624.6
Other loans and advances (b)	807.8	996.4	930.7

(a) Excludes leveraged lease receivables. (b) Excludes related corporations.

OTHER FINANCIAL INSTITUTIONS

Financial institutions registered under the *Financial Corporations Act 1974* and not contained in the tables above comprise authorised money market dealers, money market corporations, general financiers, pastoral finance companies, intra group financiers and other financial corporations. These institutions together with public unit trusts, cash management trusts, insurance companies and private and public superannuation funds also contribute to financial dealings in Western Australia. Statistical data for these institutions are generally available only on an Australian basis.

LENDING BY FINANCIAL INSTITUTIONS

New monthly statistical series were introduced in January 1985 to show a measure of the lending activity of significant lenders in fields of personal, commercial and lease

finance. These were in addition to statistics already published on secured housing finance commitments to individuals for owner occupation.

Personal finance commitments

Personal finance commitments comprise those commitments made by significant lenders to individuals for their own personal (non-business) use. A lender is considered to be significant if it is a bank, a life insurance company or a corporation registered under the *Financial Corporations Act 1974* and, during 1982-83, it committed funds exceeding \$4 million to individuals for their own use.

**TABLE 24.8 - PERSONAL FINANCE COMMITMENTS
(\$ million)**

Particulars	1985-86	1986-87
Total fixed loan commitments during period (including personal investment loans)	1,018.0	997.0
Commitments under revolving credit facilities (including credit card facilities)—		
New and increased credit limits	287.4	394.0
Cancellations and reduction of credit limits during period	176.5	180.3
Credit limits at end of period—		
Total	959.2	1,222.5
Commitments used	401.9	534.7
Commitments for loans on life policies for life offices during period	5.9	-

Commercial finance

Commercial finance commitments comprise those made by significant lenders to government, private and public enterprises, non profit organisations, or individuals (for investment and business purposes). A lender is considered to be significant if it is a bank, a corporation registered under the *Financial Corporation Act 1974*, or an insurance company and if it committed funds exceeding \$40.1 million for business purposes (excluding leasing of goods) during 1982-83.

TABLE 24.9 - COMMERCIAL FINANCE COMMITMENTS
(\$ million)

Particulars	1985-86	1986-87
Fixed loan facilities (excluding some personal investment loans) by purpose of commitment—		
Construction finance for—		
Erection of—		
Dwellings for rental/resale	55.0	69.8
Non-residential buildings	212.3	106.2
Non-building structures	9.3	3.5
Alterations and additions	23.7	14.0
Purchase of real property—		
Dwellings for rental/resale	65.2	57.1
Non-residential buildings	166.4	175.6
Rural property	45.6	65.4
Residential block development	64.2	38.9
Other land	62.1	46.7
Wholesale finance	154.1	64.9
Purchase of plant and equipment—		
Motor vehicles	83.1	82.0
Other transport equipment	45.0	19.6
Other	130.2	85.7
Re-financing	199.8	293.8
Other (including factoring)	923.6	969.7
Total fixed loan commitments	2,239.6	2,092.9
Commitments not drawn at end of year	429.0	381.3
Revolving credit facilities—		
Total credit limits at end of year	4,776.1	6,052.2
Used credit at end of year	3,023.5	3,305.6

Lease finance commitments

Lease finance commitments comprise those made by significant lenders to trading and financial enterprises, non-profit organisations, governments, public authorities and individuals.

TABLE 24.10 - LEASE FINANCE COMMITMENTS
(\$ million)

Particulars	1985-86	1986-87
Value of goods under new finance lease commitments (a)—		
Motor vehicles	185.5	175.2
Other transport equipment	29.5	9.6
Construction and earthmoving equipment	38.8	49.6
Agricultural machinery and equipment	12.4	13.6
Automatic data processing equipment and office machines	29.6	76.0
Shop and office furniture, fittings and equipment	34.6	51.3
Other	65.5	44.0
Total finance lease commitments	396.1	419.3

(a) Excludes leveraged leases.

A lender is considered to be significant if it is a trading bank or a corporation registered

under the *Financial Corporations Act 1974* and categorised as a money market corporation or a finance company or a general financier and if it committed funds exceeding \$13 million during 1982-83.

Housing finance for owner occupation

Housing finance commitments comprise secured commitments to individuals for construction or purchase of dwellings for owner occupation.

TABLE 24.11 - HOUSING FINANCE FOR OWNER OCCUPATION
(\$ million)

Particulars	1984-85	1985-86	1986-87
Secured housing finance commitments to individuals—			
Construction of dwellings—			
Houses	314.7	260.8	280.7
Other dwellings	4.9	4.7	6.8
Purchase of newly erected dwellings—			
Houses	36.1	26.9	46.8
Other dwellings	8.2	8.1	8.7
Purchase of established dwellings—			
Houses	805.6	586.1	842.0
Other dwellings	72.0	47.3	57.3
Alterations and additions	36.0	30.4	33.6
Total commitments	1,277.6	964.2	1,275.9

AUSTRALIAN STOCK EXCHANGE (PERTH) LIMITED

The Stock Exchange of Perth commenced operation in 1889, and conducted business at a number of locations before moving in December 1968 to its present quarters at Exchange House. At 30 June 1987 there were thirty-eight members of the Exchange, and Perth was the Home Exchange for 307 companies.

The Perth Exchange established Australia's first Second Board Market on 29 June 1984. The Second Board provides a new method of capital raising for relatively small companies which do not qualify for the main trading board. A Second Board company requires only a spread of 100 shareholders and \$100,000 issued capital. Listing fees are substantially lower than those for the main board.

At June 1987, 103 companies were listed on the Second Board. During the 12 months ended 30 June 1987 eighty-six of the listed

companies had traded shares with a total market capitalisation of \$594 million.

Table 24.12 gives details of turnover during each of the three years 1984-85 to 1986-87.

TABLE 24.12 - THE STOCK EXCHANGE OF PERTH LIMITED : TURNOVER OF STOCKS AND SHARES
(Source: The Stock Exchange of Perth Limited)
(\$'000)

Particulars	1984-85	1985-86	1986-87
Shares—			
Ordinary—			
Industrial	255,252	705,136	1,205,620
Oil	62,989	62,340	150,540
Mining	180,983	344,174	1,613,081
Preference	152	1,047	850
Total	499,377	1,112,697	2,970,091
Commonwealth and semi-government loans	672	639	651
Debentures, unsecured notes, etc.	313	326	662
Total	986	965	1,313
Total value of turnover	500,363	1,113,662	2,971,404

NEW CAPITAL EXPENDITURE

New capital expenditure is expenditure on new fixed tangible assets including major improvements, and alterations and additions. In general this is expenditure charged to fixed tangible assets accounts excluding expenditure on second hand assets unless these are imported from overseas for the first time.

Data are collected by quarterly sample survey of all private sector enterprises except those enterprises primarily engaged in the agriculture, construction and community services industries. Prior to December 1978 data were only available at the national level but State dissections have been produced since then. Quarterly estimates of private new capital expenditure are available in *Private New Capital Expenditure, Australia* (Catalogue No. 5626.0) and *State Estimates of Private New Capital Expenditure* (Catalogue No. 5646.0).

Details of private new capital expenditure in Western Australia for the years 1984-85 to 1986-87 are provided in Table 24.13.

TABLE 24.13 - PRIVATE NEW CAPITAL EXPENDITURE BY SELECTED INDUSTRIES AND TYPE OF ASSET
(\$ million)

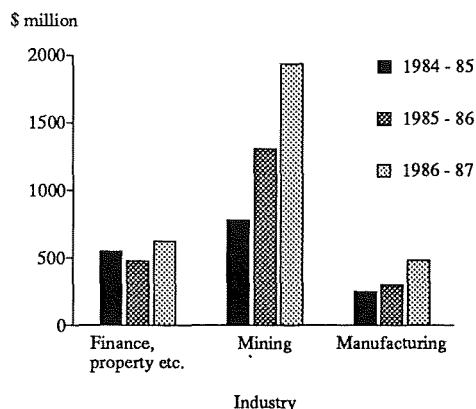
Selected industry and type of asset	1984-85	1985-86	1986-87
Finance, property and business services	568	498	643
Mining	796	1,326	1,949
Manufacturing	272	323	500
Other selected industries	282	598	538
New capital expenditure—			
New buildings and structures	700	1,310	1,576
Equipment, plant and machinery	1,218	1,434	2,055
Total	1,917	2,744	3,630

In original current price terms expenditure has increased by 89 per cent over the three years with the most substantial increase (145%) being experienced in the mining sector. The North West Shelf Gas Project, with an average daily expenditure during 1986-87 of \$4 million, provides the single most significant input. While this is expected to be the highest level reached during the construction of the project, it is expected that average capital expenditure will be sustained above \$1 million a day until 1993. In current dollar terms total capital expenditure on the project is expected to be \$12,000 million.

Capital investment on an industry basis is depicted in Diagram 24.1.

DIAGRAM 24.1

PRIVATE NEW CAPITAL EXPENDITURE BY SELECTED INDUSTRIES



REFERENCES

ABS Publications

Monthly Summary of Statistics, Western Australia (1305.5)

Savings Banks, Australia (5602.0)

Major Trading Banks, Australia (5603.0)

Banking, Australia (5605.0)

Housing Finance for Owner Occupation, Australia (5609.0)

Finance Companies: Assets, Liabilities, Income and Expenditure, Australia (5616.0)

Credit Unions: Assets, Liabilities, Income and Expenditure, Australia (5618.0)

New Capital Raisings by Companies Listed on Australian Stock Exchanges (5628.0)

Permanent Building Societies: Assets, Liabilities, Income and Expenditure, Australia (5632.0)

Co-operative Housing Societies: Assets, Liabilities, Income and Expenditure, Australia (5633.0)

Cash Management Trusts, Australia (5635.0)

Census of Superannuation Funds, Australia 1982-83 (5636.0)

Building Societies, Australia (5637.0)

Authorised Dealers and Money Market Corporations, Australia (5638.0)

Finance Companies (Financial Corporations Act), Australia (5639.0)

Credit Co-operatives, General Financiers and Other Financial Corporations, Australia (5640.0)

Personal Finance, Australia (5642.0)

Commercial Finance, Australia (5643.0)

Lease Finance, Australia (5644.0)

Private New Capital Expenditure, Australia (5626.0)

Other publications

Commonwealth of Australia Gazette, No. GN17, 26 August 1987, No. GN14, 5 August 1987

Rural & Industries Bank of Western Australia, 41st Annual Report, 1987

Reserve Bank Bulletin, September 1986

Personal Investment Monthly, June 1987.

Woodside Offshore Petroleum Pty Ltd, North West Shelf Report, Vol. 3, No. 1., March 1987

Chapter 25

SOUTH-WEST STATISTICAL DIVISION PROFILE

The South-West Statistical Division covers an area of 26,661 sq km and comprises the 15 Local Authorities of Bunbury City, Mandurah Town and the Shires of Augusta-Margaret River, Boyup Brook, Bridgetown-Greenbushes, Busselton, Capel, Collie, Dardanup, Donnybrook-Balingup, Harvey, Manjimup, Murray, Nannup and Waroona.



Bunbury City. Bunbury is the major urban centre of the South-West Statistical Division, and was the first area outside of the Perth metropolitan area to be proclaimed a city.

Photograph: Richard Woldendorp; Photo Index.

The City of Bunbury is the focus of commercial and shipping activity in the South-West Statistical Division and is the first country centre in Western Australia to hold city status.

The location and boundaries of the Division are depicted on Diagram 25.1.

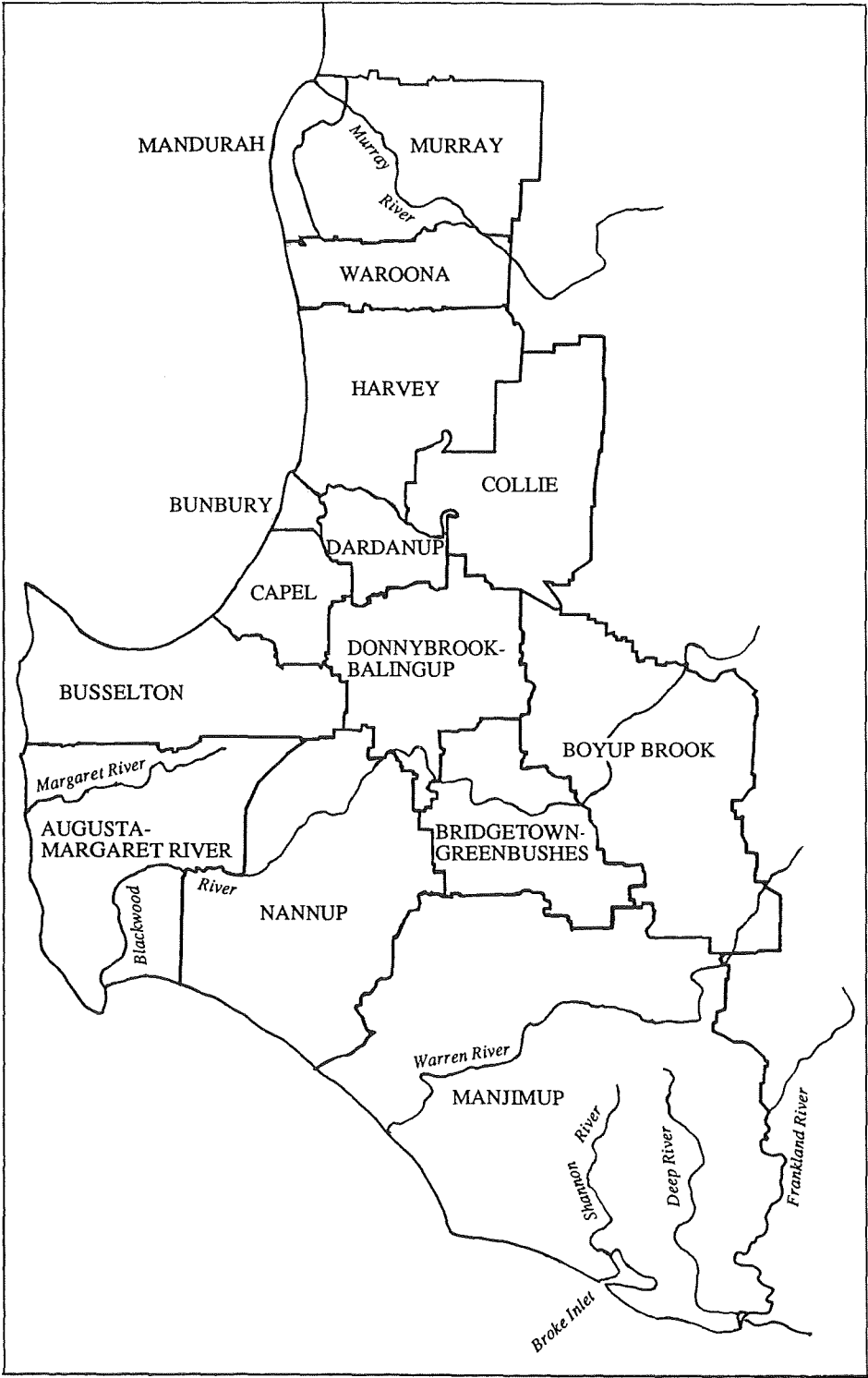
PHYSICAL FEATURES

The South-West Statistical Division basically comprises coastal lowlands, a large undulat-

ing plateau and an escarpment. Between the coast and the plateau is a long narrow lowland consisting of limestone ridges, sand dunes, sand plain and a series of lakes, estuaries and streams. The Region is drained by two major river systems— the Murray in the north and the Blackwood in the south. The Darling Scarp traverses the region from Murray Shire almost to Nannup.

DIAGRAM 25.1

SOUTH-WEST STATISTICAL DIVISION



CLIMATE AND METEOROLOGY

The climate experienced by the South-West Region is typically mediterranean, with warm dry summers and cool wet winters. As shown in Table 25.1 the majority of the Region's rainfall is distributed during the winter months of June, July and August. The more southern areas of the Division,

around Manjimup and Pemberton, experience considerably more rainfall than those towns located in the north and eastern agricultural districts.

Generally the towns of the South-West experience similar temperatures although areas towards the South Coast are again cooler than the remainder of the Division.

TABLE 25.1 - TEMPERATURE AND RAINFALL (a)

(Source: Bureau of Meteorology)

Reporting station and characteristic	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Bunbury—													
Temperature—													
Mean max °C	27.5	27.6	25.8	22.9	19.8	17.6	16.8	17.1	18.2	19.9	23.0	25.6	21.8
Mean min °C	14.8	15.1	14.1	12.0	10.2	-9.1	8.2	8.3	9.2	10.1	12.1	13.7	11.4
Rainfall -													
Average (mm)	11	12	22	46	128	183	171	124	80	54	26	14	871
Wet days -													
Average number	2	2	4	7	14	18	20	17	14	11	6	4	119
Collie—													
Temperature—													
Mean max °C	31.1	30.6	27.7	22.4	19.1	16.5	15.6	16.3	18.0	21.3	24.8	28.9	22.7
Mean min °C	14.2	14.1	12.3	9.5	7.1	6.2	4.7	4.7	6.1	7.8	10.2	12.6	9.1
Rainfall -													
Average (mm)	17	15	24	50	130	189	186	144	101	70	31	16	973
Wet days -													
Average number	3	3	5	9	17	20	22	20	17	14	8	5	143
Manjimup—													
Temperature—													
Mean max °C	26.6	26.5	24.3	20.6	17.1	15.1	14.0	14.8	16.4	18.3	21.5	24.3	19.9
Mean min °C	12.6	12.7	12.0	10.1	8.3	7.1	5.8	6.0	6.8	7.8	9.6	11.2	9.2
Rainfall -													
Average (mm)	20	20	31	64	137	180	183	148	109	81	47	24	1,044
Wet days -													
Average number	5	6	7	11	17	20	22	20	17	14	10	7	156
Pemberton—													
Temperature—													
Mean max °C	25.9	25.8	23.9	20.4	17.6	15.6	14.6	15.3	16.4	18.3	21.1	23.4	19.8
Mean min °C	12.9	13.2	12.6	10.6	8.9	8.2	6.9	6.6	7.2	8.1	9.8	11.6	9.7
Rainfall -													
Average (mm)	21	20	39	83	156	206	224	163	120	93	60	35	1,220
Wet days -													
Average number	7	5	8	12	18	20	22	21	18	15	12	9	167

(a) Long term average figures based on recordings over a period of years. Actual number of years used to calculate average may vary between reporting stations.

POPULATION

The estimated number of persons in the South-West Statistical Division at 30 June

1986 was 117,500, representing 8.16 per cent of the State total.

Table 25.2 shows the estimated resident population since 1981 in the South-West Statistical Division.

**TABLE 25.2 - ESTIMATED RESIDENT POPULATION AT 30 JUNE
SOUTH-WEST STATISTICAL DIVISION**

<i>Subdivision and statistical local area</i>	<i>1981</i>	<i>1982p</i>	<i>1983p</i>	<i>1984p</i>	<i>1985p</i>	<i>1986p</i>
Dale (a)—						
Mandurah (T)	13,520	14,810	15,300	15,950	17,100	18,030
Murray (S)	6,580	6,630	6,840	7,070	7,170	7,340
Warroona (S)	2,460	2,460	2,570	2,650	2,700	2,730
<i>Total</i>	<i>22,560</i>	<i>23,900</i>	<i>24,710</i>	<i>25,670</i>	<i>26,970</i>	<i>28,100</i>
Preston—						
Bunbury (C)	22,440	23,130	23,630	23,940	24,510	24,960
Capel (S)	2,960	3,190	3,300	3,370	3,490	3,710
Collie (S)	9,060	9,410	9,770	9,830	10,100	10,320
Dardanup (S)	3,610	3,740	3,890	4,020	4,080	4,200
Donnybrook-Balingup (S)	3,380	3,500	3,600	3,640	3,720	3,800
Harvey (S)	8,310	8,470	8,770	9,010	9,260	9,620
<i>Total</i>	<i>49,760</i>	<i>51,440</i>	<i>52,960</i>	<i>53,810</i>	<i>55,160</i>	<i>56,610</i>
Vasse—						
August-Margaret River (S)	4,000	4,080	4,130	4,230	4,330	4,540
Busselton (S)	9,810	10,100	10,310	10,470	10,910	11,310
<i>Total</i>	<i>13,810</i>	<i>14,180</i>	<i>14,440</i>	<i>14,700</i>	<i>15,240</i>	<i>15,850</i>
Blackwood						
Boyup Brook (S)	2,000	2,040	2,060	2,060	2,060	2,070
Bridgetown-Greenbushes (S)	3,290	3,360	3,420	3,460	3,570	3,620
Manjimup (S)	9,400	9,530	9,730	9,800	9,910	10,140
Nannup (S)	1,060	1,060	1,090	1,090	1,090	1,110
<i>Total</i>	<i>15,750</i>	<i>15,990</i>	<i>16,300</i>	<i>16,410</i>	<i>16,630</i>	<i>16,940</i>
Total Division	101,880	105,510	108,410	110,590	114,000	117,500

(a) Prior to 1985 Subdivision known as Murray.

EDUCATION

At 1 July 1986 the Education Department was responsible for 52 primary schools, 16 secondary schools and 4 special education support units in the South-West Statistical Division.

**TABLE 25.3 - NUMBER OF STUDENTS AT
PRE-SCHOOL, PRIMARY AND SECONDARY
SCHOOLS AT JULY 1986**

SOUTH-WEST STATISTICAL DIVISION

(Source: Western Australian Department of Education)

<i>Facility</i>	<i>Males</i>	<i>Females</i>	<i>Persons</i>
Pre-school	242	222	464
Pre-primary	1,113	1,055	2,168
Primary—			
Government	6,328	5,630	11,958
Non-government	1,093	1,076	2,169
Total primary	7,421	6,706	14,127
Secondary—			
Government	3,640	3,606	7,246
Non-government	559	542	1,101
Total secondary	4,199	4,148	8,347

In addition there were 25 non-government schools.

The Technical and Further Education Division (TAFE) of the Education Department provides tertiary courses at the South-West College in Bunbury. In February 1986 the

Bunbury Institute of Advanced Education also commenced operation.

AGRICULTURE

The climate and soils of the South West Region are well suited to a wide range of agricultural enterprises. In addition to the grazing and grain activities common to other agricultural areas, the Region has a special role in supplying milk, beef, fruit and vegetables.

**TABLE 25.4 - GROSS VALUE OF AGRICULTURAL
COMMODITIES PRODUCED (a)
SOUTH WEST STATISTICAL DIVISION
(\$'000)**

<i>Season</i>	<i>Crops and pastures</i>	<i>Livestock slaughtering and other disposals</i>	<i>Livestock products</i>	<i>Total</i>
1980-81	61,083	87,212	68,534	216,829
1981-82	68,038	69,211	62,318	199,567
1982-83	75,530	75,565	67,551	218,647
1983-84	73,209	71,764	70,188	215,160
1984-85	83,732	72,919	73,221	229,871
1985-86	83,153	68,437	80,677	232,268

(a) Gross value of commodities produced is the value placed on recorded production at the wholesale prices realised in the principal markets. Excludes beekeeping.

Table 25.4 shows the change in values of agricultural production from 1980-81 to 1985-86. The increased value of crops and pastures and livestock products has been offset by the decreased value of livestock slaughtering and other disposals.

Dairy farming

The South West is the State's main source of dairy products, with approximately 530 dairy farms in the area producing more than 200 million litres of milk annually.

Beef cattle

The South West is a high quality beef production area, where farmers can turn off fat stock all year round. The Region's 355,700 beef cattle represent nearly 23 per cent of the State's total herd.

Sheep

Farmers in the drier inland areas of the South West have tended to concentrate on wool production with more than half of the Region's 1.8 million sheep located in the Shire of Boyup Brook.

**TABLE 25.5 - LIVESTOCK NUMBERS
AT 31 MARCH 1986
SOUTH-WEST STATISTICAL DIVISION
(^{'000})**

Statistical local area	Cattle kept for		
	Meat production	Milk production	Sheep
Augusta-Margaret River (S)	30.5	17.6	96.9
Boyup Brook (S)	14.5	0.1	970.1
Bridgetown-Greenbushes (S)	22.1	0.9	189.3
Busselton (S)	49.0	14.6	109.2
Capel (S)	24.8	12.2	18.8
Collie (S)	5.7	0.3	43.4
Dardanup (S)	16.1	13.0	17.2
Donnybrook-Balingup (S)	29.5	1.9	100.4
Harvey (S)	32.4	31.8	51.0
Mandurah (T)	-	-	1.2
Manjimup (S)	51.6	6.3	127.4
Murray (S)	39.0	5.2	64.5
Nannup (S)	20.7	0.7	33.3
Waroona (S)	18.3	4.4	25.6
Other Districts	1.5	-	-
Total Division	355.7	109.2	1,848.4
Proportion of Western Australia (per cent)	22.7	89.2	5.6

Crops

The Region's main crops, barley and oats, represent a relatively small proportion of the State totals, as evidenced by Table 25.6.

The high rainfall in the Region results in oats being the dominant crop although for Western Australia as a whole wheat and barley far outweigh oats in importance.

**TABLE 25.6 - BARLEY, OATS AND WHEAT PRODUCED FOR GRAIN
SOUTH-WEST STATISTICAL DIVISION**

Season	Barley		Oats		Wheat	
	Production (^{'000} tonnes)	Proportion of State total (per cent)	Production (^{'000} tonnes)	Proportion of State total (per cent)	Production (^{'000} tonnes)	Proportion of State total (per cent)
1980-81	7.9	1.6	27.8	7.2	5.9	0.18
1981-82	7.1	1.2	29.3	6.6	3.3	0.07
1982-83	9.5	1.3	34.8	6.5	4.9	0.09
1983-84	11.1	1.4	32.5	7.1	2.6	0.06
1984-85	16.1	1.1	30.6	6.7	3.1	0.05
1985-86	11.2	1.1	20.5	6.1	1.2	0.03

Fruit and vegetables

The South-West produces a major portion of the State's fruit and vegetables. Orchards and market gardens, historically placed ar-

ound the Perth Metropolitan area, are being progressively relocated to the cooler, more fertile, southern areas of the State.

TABLE 25.7 - ORCHARD FRUIT PRODUCTION
SOUTH-WEST STATISTICAL DIVISION 1985-86
 (tonnes)

<i>Statistical local area</i>	<i>Apples</i>	<i>Apricots</i>	<i>Grape- fruit</i>	<i>Lemons and limes</i>	<i>Manda- rins</i>	<i>Necta- rines</i>	<i>Oranges</i>	<i>Peaches</i>	<i>Pears</i>	<i>Plums and prunes</i>
Augusta-Margaret River (S)	-	1.1	-	-	-	0.7	11.0	2.5	-	-
Boyup Brook (S)	-	15.6	-	-	-	-	-	-	70.0	-
Bridgetown-Greenbushes (S)	2,104.6	47.1	0.1	0.5	0.1	114.2	2.6	93.7	215.7	83.2
Busselton (S)	-	0.2	-	0.1	0.4	-	0.5	0.1	-	0.1
Capel (S)	853.5	2.9	0.5	-	10.3	17.2	883.8	12.5	285.5	12.3
Collie (S)	60.0	-	-	-	-	-	-	-	6.0	-
Dardanup (S)	219.3	4.2	38.0	-	2.0	2.4	38.4	4.6	49.1	14.4
Donnybrook-Balingup (S)	16,535.5	137.7	13.2	64.0	15.4	357.6	435.8	614.3	2,787.2	462.0
Harvey (S)	-	2.9	72.2	11.1	164.1	0.5	647.7	0.4	-	0.5
Mandurah (T)	-	-	-	-	-	-	6.4	-	-	-
Manjimup (S)	15,008.0	20.1	-	0.2	-	26.6	-	341.0	155.1	129.3
Murray (S)	1,609.9	0.7	0.1	-	8.1	254.6	127.1	58.0	35.6	115.4
Nannup (S)	69.1	1.2	0.2	-	0.8	4.8	24.6	6.9	16.9	8.6
Waroona (S)	-	-	0.1	-	1.8	-	32.4	-	-	-
Total Division	36,459.8	233.7	124.4	75.8	202.9	778.6	2,210.2	1,134.1	3,621.2	825.8
Proportion of Western Australia (per cent)	78.1	37.6	27.2	3.4	19.2	77.8	32.6	47.8	56.6	24.3

TABLE 25.8 - VEGETABLES PRODUCED FOR HUMAN CONSUMPTION
SOUTH-WEST STATISTICAL DIVISION 1985-86
 (tonnes)

<i>Statistical local area</i>	<i>Beans- French and Runner</i>	<i>Cabbages</i>	<i>Carrots</i>	<i>Cauli- flowers</i>	<i>Lettuce</i>	<i>Onions</i>	<i>Potatoes</i>	<i>Tomatoes</i>	<i>Water melons</i>
Augusta-Margaret River (S)	0.6	70.0	-	113.0	-	25.0	649.0	25.7	-
Boyup Brook (S)	-	10.0	-	45.0	-	-	154.0	-	-
Busselton (S)	1.1	2.1	-	801.6	994.7	773.6	10,194.6	113.0	3.0
Capel (S)	-	-	-	-	-	-	43.0	-	740.0
Dardanup (S)	0.3	18.0	8.0	-	-	70.0	502.0	10.0	142.0
Donnybrook-Balingup (S)	1.7	30.0	7.0	1,921.4	6.0	130.0	12,005.2	248.3	73.0
Harvey (S)	5.4	754.5	2,549.0	329.0	242.5	1,783.0	2,804.0	74.7	302.5
Manjimup (S)	162.0	240.0	-	5,519.4	104.3	2,191.0	26,819.4	230.7	-
Murray (S)	1.1	-	1,317.0	-	-	-	-	13.8	5.5
Nannup (S)	-	-	-	66.0	-	-	370.0	5.0	-
Waroona (S)	24.4	-	-	-	-	-	-	36.0	165.0
Other districts	-	0.7	-	0.1	-	70.1	-	112.2	-
Total Division	196.7	1,125.3	3,881.0	8,795.5	1,347.5	5,042.7	53,541.2	869.4	1,431.0
Proportion of Western Australia (per cent)	23.5	15.4	17.8	50.5	12.8	36.6	77.3	10.1	34.1

Viticulture

Large scale investment by private individuals and syndicates is developing a prestige wine industry in the Busselton/Margaret River district.

The climate in the district is similar to that experienced in some of the premium wine producing areas in other parts of the world.

It is an ideal wine growing environment because of the lack of frost, moisture retaining soils and low summer rainfall combined with plenty of sunshine.

Whilst production began only 15 years ago, the South-West is producing approximately 700,000 litres of wine annually, representing 20 per cent of the State's wine sales.

**TABLE 25.9 - VINEYARDS—AREA AND PRODUCTION
SOUTH-WEST STATISTICAL DIVISION**

Statistical local area	1983-84		1984-85		1985-86	
	Area under vines (hectares)	Wine produced (a) ('000 litres)	Area under vines (hectares)	Wine produced (a) ('000 litres)	Area under vines (hectares)	Wine produced (a) ('000 litres)
Augusta-Margaret River (S)	185	439.3	215	465.6	218	356.4
Busselton (S)	320	232.3	244	228.1	252	229.9
Other districts	40	51.4	43	73.0	44	101.3
Total Division	546	723.1	502	766.8	515	687.6

(a) Represents wine actually made in the statistical local area regardless of the area in which the grapes were grown. Includes spirit produced from distillation wine and used for fortification.

FORESTRY

Since the mid 19th century the timber industry has been a major source of revenue and employment in the South-West Statistical Division. More than 65 per cent of all areas in Western Australia declared as State Forests (including commercial timber resources) are located in the Region.

**TABLE 25.10 - SAWN TIMBER PRODUCTION
WESTERN AUSTRALIA
(cubic metres)**

(Source: Department of Conservation and Land Management, Western Australia).

Year ended 30 June	Hardwood	Softwood	Total
1981	330,863	22,954	353,817
1982	320,915	22,190	343,105
1983	252,124	13,216	265,340
1984	258,861	14,723	272,333
1985	291,683	21,632	313,315
1986	295,160	33,816	328,976

FISHING

The hardwood species jarrah is the principal timber produced, followed by karri. Other species used include blackbutt and marri, with increasing importance being placed on the production of softwood pine.

The South-West has up to 131 licensed fishing boats operating out of the major centres of Mandurah, Bunbury, Busselton and Augusta. An indication of the fishing catch is provided by Table 25.11.

**TABLE 25.11 - FISHERIES
SOUTH-WEST STATISTICAL DIVISION 1985-86**

		Catch (tonnes)					Total
Statistical local area	Fishing locality (a)	Fish	Crabs	Prawns	Rock lobsters	Molluscs	
Mandurah (T)	Mandurah	918	49	47	85	27	1,125
Bunbury (C)	Bunbury	697	3	-	30	19	749
Busselton (S)	Busselton	182	-	-	4	6	193
	Quindalup	73	-	-	-	-	74
	Eagle Bay	149	-	-	-	-	149
Augusta-Margaret River (S)	Margaret River	25	-	-	5	2	32
	Hamelin Bay	47	-	-	5	-	52
	Augusta	459	-	-	32	38	530
Manjimup (S)	Hardy Inlet	11	-	-	-	-	11
	Windy Harbour	47	-	-	-	9	56
	Broke Inlet	8	-	-	-	-	8
	Walpole	59	-	-	-	-	59
Total Division		2,675	52	47	161	10	3,038

(a) Fishing locality is the anchorage from which the fishermen operate.

MINING

Mineral production, valued at \$796.8 million, is one of the main commercial activities in the South-West. As Table 25.12 indicates, the mining of bauxite and its refining to alumina is by far the most important mining operation within the Division, its value being \$596.8 million in 1985-86.

TABLE 25.12 - VALUE OF MINERAL PRODUCTION
SOUTH-WEST STATISTICAL DIVISION 1985-86
(Source: Department of Mines, Western Australia)

Mineral	Value (\$)
Alumina (a)	596,824,166
Kaolin clay (b)	188,422
Coal (c)	126,840,815
Mineral beach sands (d)	58,769,588
Peat (b)	441,894
Spodumene (e)	2,967,402
Tantalite (e)	4,752,625
Tin (e)	6,015,615
Total	796,800,527
Proportion of Western Australia (per cent)	17.6

(a) Value based on the average Australian value of alumina as published by the Bureau of Mineral Resources in the Australian Mineral Industry Review. (b) Value at works. (c) Value at pithead. (d) Estimated by South West Development Authority from available data. (e) Estimated FOB value.

Coal mining, centred on the Collie district is conducted from both open-cut and underground mines and in 1985-86 almost 3.8 million tonnes of coal were extracted with a value of over \$126 million.

Other major mining activities include a tin mining operation at Greenbushes and mineral sands mining in the Capel area.

TOURISM

In recent years tourism has developed into a major industry in the South-West Statistical Division. The region offers a wide range of natural attractions such as rugged coastline, secluded sandy bays, extensive waterways, giant forests, wildflowers and spectacular caves. In addition a number of other attractions such as wineries, game parks, trout/marron farms and heritage centres have been established.

A network of more than 150 hotels, motels, guest houses and caravan parks exists to cater for visitors to the South-West and in 1986 takings from accommodation amounted to \$14 million.

TABLE 25.13 - HOTELS, MOTELS AND GUEST HOUSES
NUMBER OF ESTABLISHMENTS, ARRIVALS AND TAKINGS FROM ACCOMMODATION (a)
SOUTH-WEST STATISTICAL DIVISION

Statistical local area	1985				1986			
	Mar.	June	Sept.	Dec.	Mar.	June	Sept. (b)	Dec. (b)
Augusta-Margaret River (S)—								
No of establishments	5	5	5	5	5	5	3	3
Arrivals ('000)	10.9	7.3	6.8	9.2	13.5	9.0	9.4	9.8
Takings (\$'000)	297	229	189	258	406	296	272	356
Bridgetown-Greenbushes (S)—								
No of establishments	4	4	4	4	4	4	n.a.	n.a.
Arrivals ('000)	1.3	0.9	1.1	1.0	1.3	0.7	n.a.	n.a.
Takings (\$'000)	24	27	21	26	27	21	n.a.	n.a.
Bunbury (C)—								
No of establishments	16	15	16	16	15	15	11	11
Arrivals ('000)	19.6	13.1	12.7	15.6	17.1	14.0	14.6	20.2
Takings (\$'000)	711	510	490	565	726	544	600	866
Busselton (S)—								
No of establishments	20	20	19	19	20	20	14	14
Arrivals ('000)	20.1	12.2	12.5	14.4	19.4	13.2	11.6	15.1
Takings (\$'000)	626	336	333	433	681	375	315	468
Collie (S)—								
No of establishments	6	5	5	5	5	5	n.a.	n.a.
Arrivals ('000)	1.8	2.0	1.2	1.4	1.6	1.2	n.a.	n.a.
Takings (\$'000)	92	92	84	76	79	76	n.a.	n.a.
Mandurah (T)—								
No of establishments	11	11	10	10	10	10	7	7
Arrivals ('000)	15.5	13.0	12.2	17.4	18.9	11.6	10.9	17.0
Takings (\$'000)	789	413	355	458	726	361	306	512

TABLE 25.13 - HOTELS, MOTELS AND GUEST HOUSES
NUMBER OF ESTABLISHMENTS, ARRIVALS AND TAKINGS FROM ACCOMMODATION (a)
SOUTH-WEST STATISTICAL DIVISION—continued

Statistical local area	1985				1986			
	Mar.	June	Sept.	Dec.	Mar.	June	Sept. (b)	Dec. (b)
Manjimup (S)—								
No of establishments	16	14	13	13	13	13	7	7
Arrivals ('000)	10.8	9.4	10.5	10.6	9.9	9.7	6.9	6.6
Takings (\$'000)	225	201	221	265	247	228	173	224
Balance of Division—								
No of establishments	13	13	13	13	13	13	9	9
Arrivals ('000)	2.9	2.6	2.2	2.5	3.9	2.9	3.3	4.2
Takings (\$'000)	89	82	65	63	95	104	121	149
Total Division—								
No. of establishments	91	87	85	85	85	85	51	51
Arrivals ('000)	82.8	60.6	59.3	72.2	85.5	62.5	56.7	72.9
Takings (\$'000)	2,854	1,891	1,758	2,143	2,986	1,978	1,787	2,575

(a) Figures based on a quarterly survey of tourist accommodation establishments with the 3 monthly period ending on the final day of the month denoted. (b) As from the September quarter 1986 only those hotels, motels and guest houses with facilities (i.e. provide a bath or shower and toilet in most guest rooms and have breakfast available for guests) are included in the survey. Prior to September 1986 establishments both with and without facilities were included in the survey.

CARAVAN PARKS (a)
NUMBER OF ESTABLISHMENTS, ARRIVALS AND TAKINGS FROM ACCOMMODATION
SOUTH-WEST STATISTICAL DIVISION

Statistical local area	1985				1986			
	Mar.	June	Sept.	Dec.	Mar.	June	Sept. (b)	Dec. (b)
Augusta-Margaret River (S)—								
No of establishments	108	10	9	10	10	9	10	10
Arrivals ('000)	24.8	10.2	7.0	15.5	28.5	10.9	7.4	14.8
Takings (\$'000)	275	102	56	159	305	93	60	193
Bunbury (C)—								
No of establishments	5	5	5	5	5	4	4	4
Arrivals ('000)	7.9	7.2	8.0	9.6	7.4	8.1	3.8	4.9
Takings (\$'000)	203	129	122	134	207	135	121	132
Busselton (S)—								
No of establishments	16	16	16	16	16	16	16	16
Arrivals ('000)	31.8	16.6	10.7	21.3	37.1	13.1	9.7	21.0
Takings (\$'000)	576	205	140	327	656	174	157	354
Mandurah (T)—								
No of establishments	9	9	9	10	10	10	10	10
Arrivals ('000)	14.8	8.6	6.3	11.1	17.7	8.1	5.4	8.9
Takings (\$'000)	288	185	161	240	340	194	192	264
Manjimup (S)—								
No of establishments	7	7	7	7	7	7	7	7
Arrivals ('000)	14.0	7.5	4.9	10.5	20.1	6.9	4.9	11.4
Takings (\$'000)	110	63	38	69	128	69	42	76
Murray (S)—								
No of establishments	5	5	5	5	5	5	7	7
Arrivals ('000)	2.9	2.8	1.8	4.5	7.1	6.2	2.5	5.1
Takings (\$'000)	76	51	49	57	86	64	98	98
Balance of Division—								
No of establishments	15	15	14	15	15	15	17	17
Arrivals ('000)	11.5	4.6	4.4	4.7	10.4	2.9	2.7	7.5
Takings (\$'000)	139	90	79	93	151	70	69	125
Total Division—								
No. of establishments	67	67	65	68	68	66	71	71
Arrivals ('000)	107.7	57.5	43.1	77.2	128.3	56.2	36.4	73.6
Takings (\$'000)	1,667	825	645	1,079	1,873	799	739	1,242

(a) Figures based on a quarterly survey of tourist accommodation establishments with the three monthly period ending on the final day of the month denoted. (b) As from the September quarter 1986 the survey definition was extended to include all caravan parks. Previously the survey was restricted to those establishments predominantly providing short-term accommodation (i.e. periods of less than two months).

REFERENCES

- ABS Publications**
(Western Australian Office)
- General
 Local Government (1303.5)
- Population
 Estimated Resident Population in Statistical
 Local Areas (3204.5)
- Agriculture and Fishing
 Agriculture (7113.5)
 Livestock and Livestock Products (7221.5)
- Crops and Pastures* (7321.5)
 Fruit (7322.5)
 Agricultural Land Use and Selected Inputs
 (7411.5)
 Value of Agricultural Commodities Produced (7502.5)
 Fisheries (7601.5)
- Tourism
 Tourist Accommodation (8635.5)
- Building and Construction
 Building Approvals (8731.5)
 Dwelling Unit Commencements (8741.5)

Chapter 26

STATISTICAL SUMMARY

In the following pages, a historical summary of some of the more important statistics relating to Western Australia is shown. This is intended to present a general picture of the development of the State. Naturally the range of statistics available in the early years of the colony is limited. Also it is not always possible to achieve perfect comparability over long periods of time because of changes in definitions, scope of statistical collections etc. While major breaks in series are shown minor changes are not shown and the statistics should be interpreted with this in mind. Generally, the first year shown on each page is the earliest for which any series on that page is available. Because of space constraints, data for earlier years are shown at ten year intervals only. The pages have been arranged in chapter order.

ESTIMATED POPULATION, NATURAL INCREASE AND MIGRATION (a)

NOTE. Figures above the double lines exclude full-blood Aborigines; those below the double lines refer to total population, i.e. including Aborigines.

Year	Population at 31 December (b)			Population increase (c)				Mean population (b)		Population of Perth Statistical Division (b) (d)
	Males	Females	Persons	Recorded natural increase (e)	Estimated net migration (f)	Total increase (g)		Year ended		
						Number	Per cent (h)	30 June	December	
										(^c 000)
1829	769	234	1,003	n.a.	n.a.	n.a.	n.a.			
1830	877	295	1,172	n.a.	n.a.	169	16.85		n.a.	
1840	1,434	877	2,311	34	123	157	7.29			
1850	3,576	2,310	5,886	132	1,109	1,241	26.72			n.a.
1860	9,597	5,749	15,346	379	130	509	3.43	n.a.	15,092	
1870	15,511	9,624	25,135	475	7	482	1.96		24,894	
1880	16,985	12,576	29,561	551	—129	422	1.45		29,350	
1890	28,854	19,648	48,502	1,021	1,821	2,842	6.22		47,081	20
1900	110,088	69,879	179,967	3,214	6,495	9,709	5.70		175,113	73
1910	157,971	118,861	276,832	4,845	6,312	11,157	4.20	266,686	271,019	115.7
1920	176,895	154,428	331,323	4,761	—1,298	3,463	1.06	327,152	330,023	167.0
1930	232,868	198,742	431,610	5,426	—453	4,973	1.17	425,785	429,079	235.1
1940	248,734	225,342	474,076	4,598	—2,902	1,696	0.36	472,060	473,397	255.5
1950	294,758	277,891	572,649	9,170	19,295	28,465	5.23	545,134	557,878	351.7
1951	304,454	285,885	590,339	9,506	8,184	17,690	3.09	570,346	580,317	362.8
1952	316,700	296,235	612,935	10,204	12,392	22,596	3.83	589,887	600,615	378.1
1953	326,372	305,371	631,743	10,790	8,018	18,808	3.07	611,191	621,034	390.1
1954	334,342	314,365	648,707	10,564	6,400	16,964	2.69	630,705	639,963	402.2
1955	343,838	324,771	668,609	11,244	8,658	19,902	3.07	648,222	657,323	416.8
1956	350,333	330,935	681,268	11,344	1,315	12,659	1.89	666,898	674,459	427.4
1957	356,195	339,039	695,234	11,627	2,339	13,966	2.05	680,949	687,448	438.9
1958	361,441	345,755	707,196	11,177	785	11,962	1.72	693,568	699,915	449.3
1959	366,253	352,438	718,691	11,614	—119	11,495	1.63	705,869	711,737	459.5
1960	<u>372,665</u>	<u>358,368</u>	<u>731,033</u>	11,229	1,113	12,342	1.72	717,316	722,900	<u>470.3</u>
1961	384,773	370,440	755,213	11,349	2,571	<u>13,920</u>	<u>1.90</u>	<u>729,770</u>	<u>737,596</u>	482.7
1962	395,891	381,357	777,248	11,254	10,499	22,035	2.92	755,770	766,205	500.3
1963	407,024	391,871	798,895	11,314	10,068	21,647	2.79	777,413	788,457	517.8
1964	417,023	401,098	818,121	10,256	8,705	19,226	2.41	798,824	808,300	534.0
1965	427,330	410,918	838,248	<u>9,912</u>	<u>9,963</u>	20,127	2.46	817,157	826,481	550.9
1966	440,913	423,180	864,093	10,292	15,553	25,845	3.08	837,290	849,189	571.8
1967	458,438	438,550	896,988	11,244	21,651	32,895	3.81	863,539	879,815	597.7
1968	479,938	457,862	937,800	12,073	28,739	40,812	4.55	896,761	915,757	629.2
1969	500,378	476,242	976,620	13,404	25,416	38,820	4.14	935,985	955,660	659.7
1970	<u>520,174</u>	<u>493,878</u>	<u>1,014,052</u>	14,075	23,357	37,432	3.83	<u>975,063</u>	<u>994,201</u>	689.6
1971	547,563	522,784	1,070,347	<u>16,433</u>	<u>16,352</u>	<u>33,033</u>	<u>3.26</u>	1,013,455	1,052,785	733.0
1972	558,030	534,574	1,092,604	14,780	7,875	22,257	2.08	1,068,972	1,081,634	753.5
1973	568,500	545,482	1,113,982	12,700	8,910	21,378	1.96	1,091,845	1,101,921	773.6
1974	584,552	561,439	1,145,991	12,506	19,700	32,009	2.87	1,113,723	1,127,887	801.4
1975	594,518	572,885	1,167,403	12,411	9,410	21,412	1.87	1,142,777	1,155,499	822.1
1976	605,932	585,748	1,191,680	12,972	10,921	24,277	2.08	1,166,902	1,178,928	842.5
1977	618,210	599,006	1,217,216	12,815	11,392	25,536	2.14	1,191,588	1,204,454	861.1
1978	627,238	609,163	1,236,401	12,880	4,980	19,185	1.58	1,217,062	1,227,903	875.3
1979	636,442	620,650	1,257,092	12,499	6,847	20,691	1.67	1,237,090	1,246,800	890.6
1980	648,922	634,583	1,283,505	12,505	12,627	26,413	2.10	1,257,214	1,269,270	910.0
1981 r	667,381	652,840	1,320,221	13,905	20,858	36,716	2.86	1,284,014	1,301,528	939.1
1982 r	684,771	670,200	1,354,971	14,060	17,640	34,750	2.63	1,320,278	1,338,681	968.5
1983 r	697,570	683,441	1,381,011	14,718	8,126	26,040	1.92	1,354,814	1,368,546	990.1
1984 r	708,066	694,966	1,403,032	13,123	5,586	22,021	1.59	1,380,566	1,391,775	1,007.8
1985	724,952	711,948	1,436,900	14,272	16,304	33,868	2.41	1,404,053	1,419,004	1,033.7
1986	745,298	732,446	1,477,744	14,929	23,834	40,844	2.84	1,437,490	1,457,992	1,065.4

(a) Estimates for years prior to 1986 are based on final census results; those for 1986 are subject to revision. (b) Figures for 1971 and later refer to the estimated resident population. (c) Minus sign (—) denotes decrease. (d) At 31 December. (e) Excess of births registered over deaths registered, including deaths of defence personnel, whether in Australia or overseas, between September 1939 and June 1947. Figures prior to 1972 are on a State of registration basis; those for 1972 and later are on the basis of State of usual residence. (f) Interstate and overseas. (g) For the years 1972 to 1986 differences between the sum of natural increase and net migration, and total increase, are due to distribution of intercensal discrepancy. (h) The rates represent total increase in population during the year expressed as a proportion per cent of the population at the end of the previous year.

VITAL STATISTICS

NOTE. Figures for 1965 and earlier (i.e. those above the double lines) exclude full-blood Aborigines; later figures refer to total population, i.e. including Aborigines.

Year	Rate per 1,000 of mean population (a)					Infant mortality					
	Marriages registered	Divorces (b)	Live Births registered (c)	Deaths registered (c)(d)	Natural increase (e)	Marriages	Births	Deaths (d)	Natural increase (e)	Number (f)	Rate (g)
1840	25		54	20	34	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1850	37		186	54	132	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1860	151		588	209	379	10.01	38.96	13.18	25.11	n.a.	n.a.
1870	153		853	378	475	6.15	34.27	15.18	19.08	100	117.23
1880	214		933	382	551	7.29	31.79	13.02	18.77	72	77.17
1890	278		1,561	540	1,021	5.90	33.16	11.47	21.69	140	89.69
1900	1,781		5,454	2,240	3,214	10.17	31.15	12.79	18.35	688	126.15
1910	2,107		7,585	2,740	4,845	7.77	27.99	10.11	17.88	593	78.18
1920	2,932		8,149	3,388	4,761	8.88	24.69	10.27	14.42	538	66.02
1930	3,205		9,200	3,774	5,426	7.47	21.44	8.80	12.64	430	46.74
1940	5,234	n.a.	9,121	4,486	4,635	11.06	19.27	9.48	9.79	403	44.18
1941	5,077		10,118	4,769	5,349	10.71	21.35	10.06	11.29	357	35.28
1942	5,441		9,901	5,076	4,825	11.42	20.77	10.65	10.12	365	36.86
1943	4,528		10,481	4,587	5,894	9.50	21.98	9.62	12.36	342	32.63
1944	4,506		10,870	4,478	6,392	9.36	22.58	9.30	13.28	354	32.57
1945	3,788		10,672	4,712	5,960	7.77	21.89	9.67	12.23	315	29.52
1946	5,171	725	12,105	4,753	7,352	10.49	24.57	9.65	14.92	376	31.06
1947	5,282	807	12,874	4,723	8,151	10.50	25.60	9.39	16.21	398	30.92
1948	5,186	696	12,931	4,685	8,246	10.08	25.13	9.10	16.02	331	25.60
1949	4,951	566	13,511	4,790	8,721	9.30	25.37	8.99	16.37	357	26.42
1950	5,434	720	14,228	5,058	9,170	9.74	25.50	9.07	16.44	386	27.13
1951	5,390	682	14,794	5,288	9,506	9.29	25.49	9.11	16.38	425	28.73
1952	5,389	585	15,413	5,209	10,204	8.97	25.66	8.67	16.99	384	24.98
1953	5,032	535	15,862	5,072	10,790	8.10	25.54	8.17	17.37	378	23.83
1954	5,204	530	15,928	5,364	10,564	8.13	24.89	8.38	16.51	359	22.54
1955	5,145	479	16,623	5,379	11,244	7.83	25.29	8.18	17.11	373	22.44
1956	5,080	544	16,916	5,572	11,344	7.53	25.08	8.26	16.82	384	22.70
1957	4,897	541	16,924	5,297	11,627	7.12	24.62	7.71	16.91	357	21.09
1958	5,038	536	16,731	5,554	11,177	7.20	23.90	7.94	15.97	360	21.52
1959	5,387	584	17,111	5,497	11,614	7.57	24.04	7.72	16.32	345	20.16
1960	5,323	540	16,926	5,697	11,229	7.36	23.41	7.88	15.53	366	21.62
1961	5,150	466	17,078	5,729	11,349	6.98	23.15	7.77	15.39	336	19.67
1962	5,466	582	17,064	5,810	11,254	7.23	22.58	7.69	14.89	380	22.27
1963	5,755	553	17,290	5,976	11,314	7.40	22.23	7.68	14.55	353	20.42
1964	6,023	542	16,685	6,429	10,256	7.55	20.93	8.06	12.86	328	19.66
1965	6,448	604	16,186	6,274	9,912	7.91	19.85	7.70	12.16	351	21.68
1966	7,002	637	17,194	6,902	10,292	8.25	20.25	8.13	12.12	343	19.95
1967	7,430	726	18,023	6,779	11,244	8.44	20.48	7.71	12.78	314	17.42
1968	8,086	812	19,541	7,468	12,073	8.83	21.34	8.16	13.18	398	20.37
1969	8,993	872	20,754	7,350	13,404	9.41	21.72	7.69	14.03	453	21.83
1970	9,227	889	21,618	7,543	14,075	9.28	21.74	7.59	14.16	459	21.23
1971	9,382	1,064	24,239	7,806	16,433	8.91	23.02	7.41	15.61	464	19.14
1972	9,120	1,243	22,177	7,441	14,736	8.43	20.50	6.88	13.62	348	15.69
1973	9,102	1,424	20,510	7,845	12,665	8.26	18.61	7.12	11.49	394	19.21
1974	9,295	1,761	20,207	7,778	12,429	8.24	17.92	6.90	11.02	327	16.18
1975	9,026	2,240	20,338	7,972	12,366	7.81	17.60	6.90	10.70	271	13.32
1976	9,517	4,818	20,670	7,740	12,930	8.07	17.53	6.57	10.97	273	13.21
1977	10,063	3,975	20,651	7,899	12,752	8.35	17.15	6.56	10.59	251	12.15
1978	9,404	3,387	20,611	7,794	12,817	7.66	16.79	6.35	10.44	230	11.16
1979	9,239	3,397	20,469	8,020	12,449	7.41	16.42	6.43	9.98	247	12.07
1980	9,594	3,073	20,607	8,166	12,441	7.56	16.24	6.43	9.80	239	11.60
1981	10,111	3,481	21,877	7,993	13,884	7.77	16.81	6.14	10.67	193	8.82
1982	10,455	3,842	22,236	8,187	14,049	r7.81	r16.61	r6.15	r10.49	204	9.17
1983	10,519	3,822	23,087	8,369	14,718	r7.69	r16.87	r6.12	r10.75	179	7.75
1984	9,920	4,069	21,625	8,503	13,122	r7.13	r15.54	r6.11	r9.43	232	10.72
1985	10,398	4,039	23,109	8,836	14,273	7.33	16.29	6.23	10.06	209	9.04
1986	10,379	4,001	24,236	9,307	14,929	p7.12	p16.62	p6.38	p10.24	214	8.83

(a) Rates for 1971 and later are based on the estimated resident population. Rates for years prior to 1982 are based on final census results. (b) Final orders - dissolution of marriages. (c) Births and deaths figures for 1982 and earlier years are on a State of registration basis. Figures for 1983 are based on State of usual residence. (d) Excludes deaths of defence personnel, whether in Australia or overseas, between September 1939 and June 1947. (e) Excess of Live births registered over Deaths registered. (f) Deaths under 1 year of age; included in Deaths registered. (g) Per 1,000 live births.

SOCIAL SERVICE BENEFICIARIES AND REPATRIATION PENSIONS: WESTERN AUSTRALIA

Year ended 30 June	Social service benefits							Repatriation pensions				
	Pensioners (a)			Family allowance (a) (b)				Disability		Service		
	Age (c)(d)	Invalid (c)(d)	Total Age and Invalid	Widow	Under 16 years of age (e)(f)	Students (g)	Total	Un-employment benefit (h)	Number (a)(i)	Amount paid \$'000	Number (a)(j)	Amount paid \$'000
1910	2,361	..	2,361						n.a.	n.a.	n.a.	n.a.
1920	4,791	1,788	6,579						22,311	1,087	n.a.	n.a.
1930	8,913	3,284	12,197	n.a.	n.a.		n.a.		28,407	1,586	n.a.	n.a.
1940	19,024	3,454	22,478						21,449	1,370	1,489	103
1941	19,423	3,425	22,848					n.a.	20,388	1,343	1,545	112
1942	19,156	3,557	22,713		68,533		68,533		19,757	1,337	1,561	129
1943	18,575	3,580	22,155	2,596	65,777		65,777		20,245	1,506	1,454	147
1944	18,109	3,443	21,552	2,796	66,938		66,938		22,511	1,884	1,369	144
1945	17,713	3,414	21,127	2,894	68,316		68,316		27,686	2,105	1,343	144
1946	18,797	3,538	22,335	2,870	69,325		69,325	422	37,921	2,530	1,403	173
1947	21,162	4,002	25,164	2,570	71,968		71,968	1,095	42,127	2,856	1,580	192
1948	22,210	4,387	26,597	2,719	75,186		75,186	409	44,818	3,000	1,715	290
1949	23,739	4,340	28,079	2,876	79,693		79,693	126	46,785	3,516	1,832	301
1950	24,316	4,294	28,610	2,883	133,557	n.a.	133,557	267	48,878	3,776	1,953	331
1951	24,317	4,184	28,501	2,789	172,186		172,186	60	51,027	4,545	2,022	369
1952	24,782	3,964	28,746	2,676	183,257		183,257	57	52,071	5,429	2,136	449
1953	25,679	3,996	29,675	2,686	192,991		192,991	844	52,607	5,843	2,343	556
1954	27,248	4,101	31,349	2,753	202,098		202,098	427	53,352	6,174	2,468	605
1955	28,833	4,191	33,024	2,848	212,025		212,025	157	54,117	6,877	2,692	723
1956	30,244	4,425	34,669	3,015	220,792		220,792	473	54,427	6,902	3,648	964
1957	32,192	5,039	37,231	3,243	230,922		230,922	1,940	54,987	7,169	4,306	1,095
1958	33,124	5,519	38,643	3,542	237,732		237,732	2,330	55,251	8,017	4,672	1,395
1959	34,629	5,941	40,570	3,833	245,090		245,090	2,852	56,008	7,893	5,009	1,552
1960	36,575	6,152	42,727	4,039	250,449		250,449	2,512	56,644	8,471	5,344	1,751
1961	37,656	6,945	44,601	4,348	257,037		257,037	2,154	57,123	9,310	6,101	2,102
1962	39,104	7,826	46,930	4,570	266,067		266,067	2,932	57,947	10,177	7,115	2,687
1963	40,661	8,170	48,831	4,486	270,736		270,736	2,674	57,580	10,527	7,526	2,927
1964	41,819	8,306	50,125	4,734	275,910	7,865	283,775	2,677	57,047	11,564	7,754	3,177
1965	42,706	8,615	51,321	4,926	279,642	8,844	288,486	1,679	55,920	11,447	7,780	3,320
1966	43,876	8,575	52,451	5,071	286,534	8,769	295,303	785	54,560	12,637	7,757	3,571
1967	45,741	8,307	54,048	5,228	295,628	10,697	306,325	718	52,967	11,889	7,674	3,612
1968	48,850	8,310	57,160	5,482	306,492	10,999	317,491	608	51,193	11,934	7,586	3,777
1969	50,432	8,413	58,845	5,559	318,147	11,446	329,593	524	49,526	13,061	7,298	4,071
1970	56,017	7,933	63,950	6,086	322,058	11,539	333,597	474	47,993	12,811	7,783	4,491
1971	58,224	8,155	66,379	6,392	333,848	13,737	347,585	872	46,514	13,140	7,767	4,769
1972	60,523	8,485	69,008	6,795	343,455	15,452	358,907	2,808	45,079	14,413	7,864	5,298
1973	68,701	9,518	78,219	7,948	346,769	17,821	364,590	4,960	44,093	15,462	9,599	7,394
1974	76,124	10,406	86,530	8,763	343,404	17,585	360,989	2,863	42,807	17,363	10,669	10,191
1975	79,831	10,961	90,792	9,442	349,702	18,924	368,626	9,317	41,747	21,845	11,814	15,149
1976	84,087	12,265	96,352	10,027	352,998	20,151	373,149	13,598	40,619	23,118	13,472	20,560
1977	86,470	13,263	99,733	10,691			376,346	15,706	39,459	25,587	15,338	26,933
1978	94,491	13,653	108,144	11,494			377,545	20,470	38,053	28,728	16,975	33,785
1979	96,558	15,045	111,603	12,232			371,315 (k)	29,000	36,883	28,183	18,794	38,896
1980	98,887	15,894	114,781	12,476			375,013 (k)	29,800	35,857	29,097	21,131	45,911
1981	101,042	16,352	117,394	12,526			377,113	28,638	34,920	33,411	23,704	59,328
1982	103,397	17,195	120,592	12,654	n.a.	n.a.	385,708	316,363	34,696	35,597	26,12	169,549
1983	105,784	18,598	124,382	12,830			391,885	50,992	34,726	44,394	29,346	90,417
1984	103,889	21,124	125,013	12,934			393,952 (k)	59,400	34,808	49,981	32,640	110,663
1985	102,943	23,889	126,832	12,977			396,851 (k)	57,900	34,952	58,502	34,815	127,841
1986	103,085	25,769	128,854	12,817			388,251 (k)	54,358	35,223	67,345	36,423	144,009

(a) Number at 30 June. (b) Previously child and student endowment. Name of benefit, rates and conditions changed from 15 June 1976. (c) Prior to June 1957 excludes pensioners in benevolent homes. (d) At 30 June 1940 invalid pensioners who qualified were reclassified as age pensioners. (e) Prior to 30 June 1957 excludes endowed children in institutions. (f) Child endowment commenced 1 July 1941 for second and subsequent children. From 20 June 1950 endowment extended to include first or only children. (g) From 14 January 1964 includes students aged 16 and under 21; extended to 25 years in 1976. (h) Average number of persons on benefit at end of each week. (i) Includes pensions paid to incapacitated veterans and to dependants of incapacitated or deceased veterans. (j) Comprises pensions paid to veterans and their dependants. (k) Estimated.

NATIONAL WELFARE FUND: EXPENDITURE IN WESTERN AUSTRALIA

NOTE: The National Welfare Fund was established, with effect from 1 July 1943, in terms of the *National Welfare Fund Act 1943*. During the first two years of operation, only maternity allowances and funeral benefits were paid from the Fund. Expenditure on these items in Western Australia was \$341,014 in 1943-44 (maternity allowances \$322,710, funeral benefits \$18,304) and \$374,302 in 1944-45 (maternity allowances \$348,164, funeral benefits \$26,138). Under the provisions of the *National Welfare Fund Act 1945*, effective from 1 July 1945, expenditure on age pensions (introduced in 1909 (invalid pensions (1910), widows' pensions (1942), and child endowment (1941) became a charge on the Fund. Unemployment, sickness, and special benefits came into operation on 1 July 1945. Hospital benefit was first paid in 1945-46 (in respect of public hospitals from 1 January 1946, and private hospitals from 18 February 1946).

The principal expenditures from the Fund are shown separately in the table below.

(\$'000)

Year ended 30 June	Social services					Health services					Total expend- iture from National Welfare Fund (d)	
	Pensions		Un- employ- ment, and special benefits	Total expend- iture on social services	Hospital and nursing home benefits	Medical benefits	Pharma- ceutical benefits	Tuber- culosis cam- paign (b)	Milk for school children	Total expend- iture on health services (c)		
	Age and invalid	Widows'										
1960	19,833	1,827	9,720	1,504	33,652	3,351	2,241	3,178	1,163	458	10,427	44,079
1961	21,586	2,104	11,402	1,309	37,180	3,817	2,339	3,630	1,111	448	11,386	48,812
1962	24,344	2,371	10,205	1,887	39,575	3,996	2,455	4,809	873	526	12,695	52,270
1963	25,582	2,377	10,485	2,006	41,203	4,189	2,657	5,161	885	584	13,501	54,705
1964	27,373	3,115	12,994	1,978	46,223	4,705	2,808	5,242	839	615	14,238	60,460
1965	29,413	3,463	13,406	1,401	48,450	4,987	3,716	5,294	822	637	15,486	64,635
1966	30,760	3,602	13,624	872	49,648	5,286	4,345	5,870	758	619	16,906	67,316
1967	33,794	4,011	15,498	855	55,001	5,881	4,944	6,719	600	698	18,998	74,666
1968	36,418	4,346	14,845	758	57,295	6,598	5,265	7,117	862	850	20,860	78,894
1969	39,404	4,786	15,540	795	61,729	7,401	5,600	8,702	645	797	23,340	85,828
1970	44,637	5,600	17,894	1,039	70,725	9,153	6,373	9,836	828	797	27,262	98,577
1971	48,979	6,172	16,423	1,699	75,279	10,256	9,782	11,215	800	835	33,246	109,216
1972	57,374	7,180	18,188	4,298	89,623	14,492	13,800	12,418	907	997	43,032	133,770
1973	76,188	10,064	21,407	8,372	119,622	19,062	15,958	13,258	824	1,086	50,827	171,763
1974	98,011	13,409	19,009	8,314	147,040	21,222	16,478	16,153	803	596	56,535	205,778
1975	138,812	18,459	19,085	24,944	213,981 (e)	25,758	19,437	19,830	1,023	..	68,542	284,016

(a) A number of endowments are paid every twelve weeks. Although in most years there are four such payments, there are some years in which five payments are made. (b) Comprises amounts paid to individuals in the form of allowances and to the State Government as reimbursements for expenditure incurred in the provision and maintenance of facilities. (c) Excludes some relatively minor expenditure not allocable among States. In 1974-75 such costs, for Australia as a whole, amounted to \$6.63 million and comprised \$1.63 million for the supply of blood products; radio-active isotopes, \$2.44 million; hearing aids for school children and pensioners, \$1.72 million; poliomyelitis vaccine, \$0.27 million; and other vaccines, \$0.57 million. (d) See footnote (c). (e) Includes expenditure of \$857,000 covering the operating deficits of certain nursing homes.

NOTE: This series has been replaced by 'Commonwealth Government Cash Benefits to or for Persons in Western Australia'

COMMONWEALTH GOVERNMENT CASH BENEFITS TO OR FOR PERSONS IN WESTERN AUSTRALIA

NOTE: This series replaced 'National Welfare Fund: Expenditure in Western Australia' (\$'000)

Year ended 30 June	Health services and benefits				Social security and welfare benefits							Total cash benefits
	Hospital and institutional	Clinical and non-institutional and public health	Pharmaceutical	Total	Ex-service men and dependants	Age pensions	Unemployment and sickness benefits	Sole parent, family and child benefits n.e.c.	Other	Total	Other services	
1979	24,290	37,342	18,287	79,919	67,067	238,241	90,042	111,464	94,177	600,991	28,770	709,680
1980	27,771	42,135	18,717	88,623	74,995	258,650	96,078	117,148	108,903	655,774	28,631	773,028
1981	37,095	48,754	22,138	107,987	92,714	290,394	98,604	128,446	126,817	736,975	32,231	877,193
1982	46,954	58,881	28,497	134,332	105,147	334,791	125,389	156,684	146,891	868,90	236,690	1,039,924
1983	54,954	71,699	33,122	159,775	134,811	364,234	224,646	199,396	169,662	1,092,749	42,512	1,295,036
1984	42,164	114,152	35,673	191,989	160,665	400,380	294,750	234,797	192,544	1,283,136	55,175	1,530,300
1985	51,700	176,200	49,200	277,100	186,200	428,500	310,500	256,600	227,600	1,409,400	53,800	1,740,300
1986	60,600	200,900	53,900	315,400	211,700	450,200	317,500	281,500	255,600	1,516,500	59,500	1,891,400

LAND TENURE; LIVESTOCK; WOOL PRODUCTION; CROPS

Year	Land alienated and land in process of alienation (a)	Land held under lease or licence (b)	Livestock (c)			Wool production (d)		Area used for crops (f)
						Quantity	Gross value (e)	
	'000 hectares	'000 hectares	'000	'000	'000	tonnes	\$'000	'000 hectares
1829	212	-	-	1	-	n.a.		n.a.
1830	256	-	1	8	-	n.a.		n.a.
1840	647	-	2	31	2	n.a.		1
1850	538	-	13	128	3	n.a.		3
1860	614	2,251	32	260	11	298	n.a.	10
1870	593	4,953	45	609	13	811		22
1880	860	18,179	64	1,232	24	1,970		26
1890	2,159	42,388	131	2,525	29	3,161		28
1900	2,679	35,360	339	2,434	62	4,323		81
1910	7,376	67,992	825	5,159	58	13,210	2,141	346
1920	9,581	106,125	850	6,533	61	18,947	4,552	730
1930	14,571	91,624	813	9,883	101	32,451	4,829	1,939
1940	13,010	84,710	789	9,516	218	32,362	7,889	1,614
1950	13,515	82,101	865	10,923	79	42,071	47,237	1,737
1951	13,902	82,918	841	11,362	90	46,680	118,068	1,834
1952	14,296	83,587	852	12,188	86	52,681	64,027	1,824
1953	14,911	83,218	846	12,475	76	54,760	75,121	1,877
1954	15,213	84,432	830	13,087	101	58,497	82,567	1,812
1955	15,385	86,450	861	13,411	107	56,324	67,985	2,041
1956	15,507	87,332	897	14,128	99	67,932	69,642	2,118
1957	15,746	89,111	957	14,887	140	67,301	90,283	2,080
1958	15,925	88,388	997	15,724	151	68,504	75,228	2,230
1959	16,180	92,311	1,000	16,215	115	71,376	59,407	2,434
1960	16,343	92,640	1,030	16,412	131	72,979	75,302	2,583
1961	16,637	94,479	1,100	17,151	176	82,652	73,863	2,734
1962	17,079	99,722	1,218	18,314	174	83,159	79,283	2,823
1963	17,484	99,364	1,298	18,727	131	80,366	80,071	2,965
1964	17,848	99,771	1,299	20,165	128	95,053	116,331	2,714
1965	18,287	99,444	1,258	22,392	137	91,170	93,275	2,950
1966	18,737	99,764	1,271	24,427	144	108,116	115,183	3,419
1967	19,192	100,581	1,357	27,370	161	119,681	121,509	3,463
1968	19,504	100,976	1,427	30,161	183	131,379	116,653	3,595
1969	19,620	100,716	1,546	32,901	220	164,307	158,264	3,840
1970	19,761	102,957	1,681	33,634	250	144,527	120,819	3,916
1971	19,545	103,389	1,781	34,709	278	151,808	92,009	3,831
1972	19,531	103,218	1,975	34,405	427	170,219	135,137	3,751
1973	19,539	102,711	2,182	30,919	476	140,649	225,041	3,855
1974	19,493	101,408	2,330	32,451	344	143,147	251,712	4,133
1975	19,505	99,899	2,544	34,476	264	172,659	218,859	3,758
1976	18,686	100,053	2,654	34,771	260	174,807	242,027	4,207
1977	18,723	99,360	2,464	31,158	242	156,237	291,358	4,416
1978	18,779	99,319	2,271	29,823	237	143,127	258,034	4,910
1979	18,905	97,074	2,092	30,265	271	150,284	286,601	4,993
1980	18,958	98,139	2,065	30,431	293	147,840	348,214	5,280
1981	19,070	97,987	2,033	30,764	289	160,096	401,030	5,547
1982	19,091	98,108	1,942	30,268	263	145,126	378,540	5,963
1983	19,151	97,947	1,754	30,164	300	148,190	392,740	6,379
1984	18,969	99,444	1,730	29,518	300	138,423	404,251	6,526
1985	n.y.a.	n.y.a.	1,673	31,574	274	166,559	499,172	6,723
1986	n.y.a.	n.y.a.	1,690	33,213	278	171,640	571,019	5,970

(a) From 1910 to 1946 at 30 June; for earlier years and from 1947 at 31 December. (b) Comprises allocations by Lands Department and certain leases and licences issued by Mines and Forests Departments. Apparent decrease in 1950 due mainly to revision in records of the Department of Land Administration. (c) At 31 December for 1941 and earlier years; from 1943, the figures shown relate to 31 March. (d) Comprises shorn, dead and fellmongered wool. Excludes wool exported on skins. For 1947 and earlier, year ended 31 December; figures shown for 1949 to 1964 are for the year ended 31 March. From 1965 figures relate to the year ended 30 June in the following year. (e) Figures for 1949 and 1951 to 1955 exclude distributions of profits under the 1939-1945 War-time Wool Disposals Plan aggregating \$13,869,934. Separate State figures are not available for distributions made from 1956 to 1958 when payments were virtually complete. (f) Excludes pasture hay and from 1967 also excludes lucerne.

AGRICULTURE

Year (a)	Area and production of principal grain crops									
	Wheat				Oats		Barley		Hay (all kinds)	
	Production			Gross value	Production		Production		Production	
	Area	Yield per hectare	Total		Area	Production	Area	Production	Area	Production
		'000 hectares	'000 tonnes							
	'000 hectares	tonnes	'000 tonnes	\$'000	'000 hectares	'000 tonnes	'000 hectares	'000 tonnes	'000 hectares	'000 tonnes
1840	1	1.11	1		n.a.	n.a.	n.a.	n.a.	-	n.a.
1850	2	n.a.	n.a.		n.a.	n.a.	n.a.	n.a.	1	n.a.
1860	6	1.00	6	n.a.	-	-	1	1	2	8
1870	11	0.79	9		1	1	2	2	7	21
1880	11	0.62	7		-	-	2	2	8	20
1890	14	0.92	13		1	1	2	2	9	25
1900	30	0.70	21	310	2	2	1	1	42	106
1910	236	0.68	161	2,162	25	14	1	1	71	182
1920	516	0.65	333	11,023	78	37	4	3	108	268
1930	1,601	0.91	1,456	12,201	111	60	7	4	161	500
1940	1,062	0.54	573	8,648	174	59	27	16	169	381
1941	1,073	0.95	1,021	15,615	165	97	28	22	132	421
1942	709	0.79	561	10,080	138	66	20	12	102	282
1943					(b)					
1944	634	0.71	450	9,531	145	72	25	16	114	319
1945	614	0.71	434	8,319	163	70	31	20	133	344
1946	743	0.77	570	15,871	160	74	27	15	114	292
1947	982	0.66	648	22,048	172	66	27	12	112	284
1948	1,117	0.84	939	50,265	200	98	25	17	93	272
1949	1,161	0.85	987	42,122	215	127	26	22	92	281
1950	1,171	0.89	1,048	51,339	237	132	28	22	87	276
1951	1,289	1.05	1,358	65,328	237	144	24	21	72	231
1952	1,253	0.87	1,089	58,984	266	140	23	16	70	215
1953	1,214	0.80	965	55,194	337	189	43	40	92	295
1954	1,168	0.93	1,030	55,423	297	174	85	62	89	299
1955	1,206	0.77	933	43,655	354	174	105	64	117	310
1956	1,170	1.24	1,449	68,840	442	300	136	106	109	390
1957	1,119	0.78	874	44,055	425	189	139	85	98	293
1958	1,197	0.75	901	45,912	467	250	124	81	137	392
1959	1,332	1.18	1,569	77,639	538	410	130	123	135	462
1960	1,505	1.06	1,597	82,361	502	356	170	161	129	440
1961	1,627	1.07	1,739	92,290	538	396	219	193	115	387
1962	1,773	1.01	1,788	100,023	498	366	199	165	119	402
1963	1,944	1.01	1,973	107,023	476	367	158	137	138	460
1964	1,878	0.76	1,424	74,389	455	324	121	92	117	395
1965	2,085	0.82	1,717	88,557	466	254	123	84	123	396
1966	2,489	1.12	2,780	153,050	502	422	167	147	118	421
1967	2,569	1.09	2,809	153,157	487	401	151	152	119	424
1968	2,690	1.08	2,911	170,102	469	359	168	159	129	428
1969	2,952	1.04	3,060	151,306	442	416	224	208	138	508
1970	2,747	0.66	1,815	90,961	461	281	364	273	202	576
1971	2,361	1.25	2,957	153,227	520	520	632	769	190	673
1972	2,042	1.06	2,165	115,934	454	414	911	1,000	177	653
1973	2,437	0.82	2,003	109,399	297	212	744	640	224	664
1974	2,978	1.41	4,211	461,049	325	383	510	626	220	734
1975	2,810	1.17	3,277	361,211	262	250	387	329	164	508
1976	3,171	1.30	4,122	427,507	320	386	419	505	163	536
1977	3,314	0.98	3,249	290,489	372	347	452	553	169	560
1978	3,609	0.82	2,945	292,901	415	416	614	751	191	597
1979	3,706	1.19	4,400	546,827	427	491	616	778	184	586
1980	4,121	0.91	3,739	571,158	370	399	523	632	208	636
1981	4,333	0.77	3,315	508,734	382	384	535	504	240	703
1982	4,593	1.05	4,803	762,706	432	442	580	576	255	711
1983	4,865	1.14	5,534	982,505	461	534	603	717	252	754
1984	4,746	0.91	4,316	702,330	448	456	771	797	238	676
1985	4,652	1.41	6,580	11,134,766	351	460	965	1,431	226	747
1986	4,148	1.05	4,362	736,334	288	338	826	1,024	201	633

(a) Figures shown for 1942 and earlier are for the year ended last day of February in the following year; those shown for 1944 and later are for the season ended 31 March. (b) Due to the change in recording procedures figures for 1943 are not available (see footnote (a)).

PRIMARY PRODUCTION—MISCELLANEOUS

Year	Gold production (a) (b)		Coal production (b)		Average values f.o.b.	
	Quantity	Value	Quantity	Value	Wool (greasy) per kg (c)	Wheat per tonne (d)
	'000 grams	\$'000	'000 tonnes	\$'000	cents	\$
1860	-	-	-	-	-	19.83
1870	-	-	-	-	-	..
1880	-	-	-	-	n.a.	18.37
1890	622	171	-	-	-	..
1900	43,980	12,015	120	110	-	5.51
1910	45,753	12,494	266	227	16.20	14.85
1920	19,222	6,951	469	701	28.26	26.33
1930	13,001	3,729	509	770	19.37	16.69
1940	37,044	25,393	548	729	25.68	11.19
1941	34,494	23,703	566	779	28.70	14.49
1942	26,376	17,731	590	923	28.64	15.12
1943	16,982	11,421	541	979	32.19	15.09
1944	14,494	9,800	567	1,166	34.81	17.71
1945	14,588	10,021	552	1,146	34.24	23.30
1946	19,191	13,280	652	1,460	34.92	31.81
1947	21,897	15,151	743	1,680	45.64	48.42
1948	20,684	14,314	745	1,760	76.41	64.33
1949	20,155	15,926	763	1,944	94.20	56.11
1950	18,973	18,933	827	2,575	105.91	57.03
1951	19,533	19,451	862	3,434	263.50	62.25
1952	22,706	23,696	843	4,915	138.10	62.64
1953	25,629	26,598	900	6,146	148.04	63.57
1954	26,469	26,627	1,034	7,178	156.20	60.90
1955	26,189	26,749	919	6,179	135.39	52.22
1956	25,256	26,405	843	5,448	112.66	46.57
1957	27,900	29,102	852	5,105	144.67	48.12
1958	26,967	28,357	885	4,561	130.80	56.35
1959	26,967	28,388	926	4,713	91.87	51.76
1960	26,625	28,140	937	4,878	115.37	49.48
1961	27,122	28,584	778	3,361	99.10	49.91
1962	26,717	28,115	934	3,962	109.80	51.90
1963	24,883	26,375	916	3,970	111.38	52.30
1964	22,177	23,383	1,003	4,679	134.47	52.01
1965	20,497	22,381	1,010	4,410	120.58	51.66
1966	19,564	23,316	1,078	4,562	116.00	51.12
1967	17,916	21,690	1,079	4,765	117.46	54.88
1968	15,925	19,407	1,104	4,817	105.69	51.31
1969	14,961	19,040	1,120	4,853	107.60	51.26
1970	12,310	15,811	1,178	5,407	98.11	47.72
1971	10,736	13,674	1,190	5,653	75.33	48.88
1972	10,848	14,835	1,188	5,855	74.94	49.52
1973	9,264	16,718	1,154	6,422	150.21	49.67
1974	7,173	19,183	1,197	7,237	215.36	98.75
1975	6,305	29,788	1,879	12,511	144.37	126.39
1976	7,644	27,141	2,157	17,613	147.62	116.89
1977	7,619	31,586	2,339	21,896	188.10	105.10
1978	13,653	64,741	2,435	24,846	195.76	(e)92.52
1979	12,231	78,313	2,406	34,484	207.87	(e)116.53
1980	11,598	158,253	3,039	54,464	(e)253.81	(e)146.45
1981	10,532	165,376	3,127	63,100	(e)270.01	(e)160.32
1982	16,135	178,566	3,435	75,132	(e)288.61	(e)155.48
1983	22,992	334,802	3,903	95,529	(e)303.41	(e)168.10
1984	26,183	365,453	3,942	106,325	(e)317.08	(e)173.81
1985	37,425	508,892	3,673	109,120	(e)353.01	(e)187.09
1986	46,072	707,114	3,765	126,841	(e)376.50	(e)185.14
1987	64,911	1,300,079	3,796	n.a.	(e)431.05	(e)144.86

(a) Prior to 1971 comprises gold refined at the Mint and gold contained in gold-bearing materials exported. From 1971 covers gold production as notified by the Department of Mines. (b) From 1969 figures relate to year ended 30 June. (c) From 1920 figures relate to year ended 30 June. (d) Prior to 1940 averages generally are based on exports of the previous season's wheat; from 1940 they relate to exports during the year ended 30 June. (e) Foreign exports only.

VALUE OF PRIMARY COMMODITIES PRODUCED
(Excluding Mining)
(\$'000)

Year (a)	<i>Gross value of primary commodities produced (excluding mining) (b)</i>					
	Agriculture	<i>Dairying, poultry farming and beekeeping</i>	Pastoral (c)	Hunting	Forestry	Fisheries (d)
1920	17,466	2,065	(e)9,008		n.a.	n.a.
1930	24,503	3,433	(e)10,800		2,159	544
1940	22,210	5,230	11,463	139	2,660	539
1941	14,477	5,960	11,460	241	3,160	479
1942	18,707	7,664	11,958	276	2,950	255
1943	17,534	7,971	16,155	190	3,277	347
1944	18,021	8,473	18,156	225	3,150	330
1945	20,466	8,709	15,385	215	3,152	438
1946	26,237	8,933	15,948	281	3,358	635
1947	32,367	9,790	21,986	465	3,305	1,135
1948	64,317	11,964	37,036	395	3,649	1,379
1949	58,231	12,975	-	-	4,024	1,432
1950	63,008	14,155	62,307	393	4,501	1,649
1951	87,752	18,778	131,920	499	6,741	2,505
1952	86,791	21,289	83,584	488	8,517	3,286
1953	87,127	22,328	92,964	461	7,155	-
1954	86,533	21,762	101,566	609	7,678	3,808
1955	77,164	-	87,435	335	8,116	4,383
1956	109,709	22,433	89,293	361	10,474	4,915
1957	80,170	23,240	112,885	277	10,305	5,563
1958	87,293	23,500	94,118	175	11,046	6,530
1959	126,672	22,838	81,639	125	10,903	7,818
1960	131,052	24,696	100,255	288	10,919	8,621
1961	140,003	25,917	101,051	579	11,082	8,569
1962	148,765	26,400	105,310	511	11,104	10,689
1963	157,948	27,387	107,280	376	10,877	11,219
1964	123,342	28,723	148,701	632	11,462	10,187
1965	139,426	30,884	125,837	775	12,093	15,218
1966	215,949	32,899	157,249	836	12,731	15,733
1967	218,206	33,022	159,857	986	13,300	16,525
1968	234,020	35,485	158,754	1,236	14,076	21,954
1969	218,643	38,801	210,780	1,211	13,465	23,717
1970	156,738	40,460	176,387	1,098	13,632	19,660
1971	262,391	42,330	146,198	834	16,174	25,127
1972	216,969	45,170	199,443	838	14,660	30,817
1973	203,417	50,136	321,111	2,132	14,607	28,158
1974	587,628	59,649	369,636	1,739	15,264	30,494
1975	(f)835,885			1,657	19,995	35,130
1976	996,633			1,744	23,404	51,079
1977	959,160			2,622	26,349	69,094
1978	993,889			2,675	24,529	88,340
1979	1,343,932			4,842	27,612	96,055
1980	1,572,744			3,699	33,366	85,597
1981	1,678,031			|	|	82,764
1982	1,874,267			|	|	99,254
1983	2,196,230			n.a.	n.a.	126,208
1984	1,940,843			|	|	142,658
1985	2,602,205			|	|	165,443
1986	2,214,153			|	|	138,690

(a) Figures relate to varying time periods (e.g. year ended 30 June, year ended 31 December, year ended 31 March) due to changes in the method of collection. (b) Estimated value of recorded production based on wholesale prices realised at the principal market. (c) In addition the following amounts were paid as interim distribution of profits under the 1939-1945 Wartime Wool Disposals Plan: in 1949, \$3,629,478; in 1951, \$3,629,478; in 1952, \$2,325,324; in 1953, \$368,104; in 1954, \$2,120,460; and in 1955, \$1,797,090. Separate State figures are not available for distributions made from 1956 to 1958 when payments were virtually complete. (d) Figures for 1979 exclude pearling and whaling. (e) Separate details not available. (f) From 1975 this dissection has been contracted to the single industry 'Agriculture'.

SECONDARY PRODUCTION

Year (a)	Manu- facturing establish- ments (b)	Persons employed (c)	Wages and salaries (d)	Turn- over (e)	Value added (f)	Production of selected commodities						Timber from local logs (l)
						Bricks (g)	Scoured wool (h)	Bacon and ham (i)	Butter (j)	Flour (plain) (k)	Cheese (k)	
	No.	No.	\$'000	\$'000	\$'000	'000	tonnes	tonnes	tonnes	tonnes	tonnes	'000 cu m
1900	632	11,166	2,589	n.a.	n.a.	25,234	|	n.a.	132	11,375	|	266
1910	822	14,894	3,532	10,158	5,472	23,162	n.a.	n.a.	291	33,401	n.a.	412
1920	998	16,942	6,073	26,283	9,708	31,838	|	850	553	108,976	|	325
1930	1,466	19,643	8,310	33,783	14,976	47,720	|	1,180	2,143	109,402	|	377
1940	2,129	22,967	9,150	40,615	18,055	43,786	2,459	2,106	6,351	127,776	382	360
1950	3,023	40,733	30,586	172,956	522,088	58,943	7,110	3,599	6,878	144,691	712	363
1951	3,111	43,761	39,316	168,862	68,441	67,312	5,828	3,615	6,906	197,172	760	416
1952	3,267	45,097	50,769	213,143	85,491	76,884	5,884	3,739	6,813	201,255	634	471
1953	3,424	45,188	56,687	238,620	98,383	86,043	6,162	3,752	6,584	203,509	909	527
1954	3,523	47,459	63,181	269,174	110,294	101,240	6,914	3,503	6,241	170,513	1,224	569
1955	3,727	49,314	69,476	299,169	121,912	115,412	7,226	3,369	7,260	150,381	1,100	593
1956	3,871	50,108	74,413	350,293	139,466	102,359	9,483	3,283	7,523	162,715	775	578
1957	3,935	48,748	73,833	375,272	146,884	101,209	11,044	3,103	7,582	153,800	1,201	539
1958	3,941	48,462	75,870	392,525	150,624	111,082	11,708	2,999	6,916	134,398	1,033	550
1959	4,125	48,417	77,464	392,405	157,524	101,521	12,791	3,002	6,265	126,736	1,200	561
1960	4,279	49,651	83,285	431,165	172,747	110,359	15,271	3,228	7,494	136,780	1,466	532
1961	4,334	50,666	90,255	481,140	193,262	119,998	13,420	3,214	7,784	152,622	1,373	496
1962	4,418	51,033	92,840	486,988	196,083	119,868	14,459	3,556	7,603	128,007	1,386	505
1963	4,492	53,435	99,880	517,899	216,422	131,176	13,312	3,899	7,075	123,296	1,462	486
1964	4,609	55,705	108,515	555,058	230,511	155,792	12,464	3,841	7,026	129,996	1,530	517
1965	4,734	58,097	119,978	616,422	260,637	146,057	12,040	4,047	7,887	121,906	1,838	550
1966	4,906	60,282	134,171	678,751	288,803	140,611	12,107	4,357	8,225	103,115	1,230	552
1967	5,167	63,757	153,597	765,224	335,788	163,166	12,148	4,654	6,529	91,725	1,726	533
1968	5,404	67,335	175,100	887,372	388,257	207,575	12,662	5,173	6,009	100,418	1,983	557
1969	2,585	59,853	183,168	919,555	361,473	273,078	14,415	5,591	6,332	96,641	2,022	444
1970	2,705	62,597	208,410	1,028,778	414,999	288,949	14,940	5,399	5,915	92,635	1,718	450
1971	(m)	(m)	(m)	(m)	(m)	240,323	10,724	4,863	5,425	96,411	1,917	449
1972	2,727	64,217	255,879	1,240,106	472,013	227,581	17,009	5,116	5,988	84,227	1,979	407
1973	2,814	64,074	275,455	1,375,859	501,034	278,610	11,987	5,257	5,324	77,680	1,869	405
1974	2,818	67,884	346,942	1,741,029	658,412	304,178	10,791	5,530	5,223	79,114	1,922	408
1975	1,974	65,852	434,272	2,032,374	779,842	262,905	11,779	5,294	4,981	84,486	2,291	392
1976	2,054	65,953	508,931	2,432,654	944,459	328,356	13,969	5,439	4,531	78,447	2,673	388
1977	2,035	66,750	594,514	2,882,421	1,151,619	385,942	15,818	5,836	3,340	|	2,074	375
1978	2,037	65,740	629,095	3,031,505	1,208,749	357,391	13,308	5,666	2,212	|	1,812	386
1979	2,202	65,232	670,772	3,498,828	1,321,683	381,092	16,129	5,516	1,373	|	2,364	341
1980	2,301	65,987	734,204	4,259,065	1,643,325	404,954	20,128	5,930	995	n.a.	2,866	349
1981	2,426	68,870	869,223	4,902,236	1,876,664	381,909	21,645	6,062	834	|	3,342	347
1982	2,603	70,799	1,013,397	5,490,999	2,052,683	391,743	19,574	6,074	799	|	3,322	334
1983	2,499	64,980	1,038,300	5,596,500	2,040,900	279,164	13,747	6,405	914	|	3,417	257
1984	2,408	61,997	1,047,393	5,922,692	1,136,745	n.p.	17,053	6,807	1,269	|	3,665	265
1985	2,451	64,242	1,137,558	6,788,471	2,513,218	n.p.	21,938	7,862	1,582	|	3,736	305
1986	(m)	(m)	(m)	(m)	(m)	n.p.	22,992	8,174	1,595	|	3,417	325

(a) From 1930 year ended 30 June. (b) For details of breaks in series refer to publications of Censuses of Manufacturing Establishments statistics. (c) Average over whole year including working proprietors. Prior to 1926-27 includes fallers and haulers employed by sawmills. (d) Figures for 1929-30 and later exclude amounts drawn by working proprietors. (e) Selling value 'at the factory'. (f) Value added in course of manufacture, representing sum available for payment of wages, rent, depreciation, other sundry expenses and for interest and profit. (g) For years prior to 1964-65 figures represent clay bricks only (all sizes). (h) Excludes fellmongered, dead or waste wool. (i) From 1977-78 excludes canned bacon and ham. (j) For 1917 and earlier years, includes butter made on farms. Source: from 1977-78 to 1980-81, Western Australian Department of Agriculture; from 1981-82, the Australian Dairy Corporation. (k) Source: 1933-34 to 1967-68, annual manufacturing census; 1968-69 to 1970-71, Commonwealth Dairy Produce Equalisation Committee Limited; from 1971-72 to 1980-81, Western Australian Department of Agriculture; from 1981-82, the Australian Dairy Corporation. (l) Prior to 1968-69, figures also include hewn timber. (m) No census of manufacturing establishments was conducted for this year.

STATISTICAL SUMMARY

BUILDING COMPLETED (a)

Year ended 30 June	Houses (b) (c)		Other residential buildings (b) (c)		Alterations and additions (d) to residential buildings	Non-residential buildings (e)				Total all building (e)
	Number (f)	Value (e)	Number of units	Value (e)	Value (e)	Factories	Offices	Educ- ational	Total	
		\$'000		\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
1946	860	1,452	2	4		144			492	1,948
1947	1,792	3,516	-	-		98			716	4,232
1948	2,771	5,784	-	-		176			872	6,656
1949	3,244	7,592	-	-		440			1,822	9,414
1950	3,509	8,974	101	194		446			1,536	10,704
1951	5,160	15,032	305	606		410	n.a.	n.a.	2,258	17,896
1952	6,577	24,466	215	300		1,402			4,086	28,852
1953	7,965	37,988	100	334		1,668			7,514	45,836
1954	7,627	39,768	22	834		1,734			10,968	51,570
1955	8,792	48,422	316	1,176		6,250			18,594	68,192
1956	7,760	45,084	584	2,564		3,756	842	2,162	19,708	67,356
1957	5,030	29,054	365	1,502	(g)	2,210	2,002	1,162	16,292	46,848
1958	6,196	36,526	171	712		2,526	3,906	1,110	17,286	54,524
1959	5,846	34,410	212	840		2,792	2,384	4,584	25,274	60,524
1960	5,997	35,454	263	986		2,368	1,544	5,838	23,800	60,240
1961	5,973	38,102	440	1,580		4,736	4,118	7,956	32,368	72,050
1962	6,082	39,470	265	1,342		3,038	2,902	6,014	27,260	68,072
1963	6,593	45,780	642	2,984		4,912	1,588	7,724	37,664	86,428
1964	7,276	51,774	1,295	5,596		5,384	5,996	6,22	35,498	92,868
1965	7,445	57,238	1,841	9,046		6,816	2,820	8,04	40,816	107,100
1966	7,265	58,089	1,624	9,096		9,631	10,576	8,459	62,993	130,178
1967	8,272	78,078	1,742	9,322		9,841	7,093	10,477	74,735	162,135
1968	9,858	97,370	2,392	12,577		15,061	14,608	12,051	85,456	195,403
1969	12,840	133,276	3,491	22,406		15,845	10,885	14,122	99,152	254,833
1970	13,933	151,300	5,596	40,519		16,615	14,294	13,297	111,577	303,397
1971	11,900	149,267	5,013	39,964	404	18,006	39,736	20,589	175,377	365,012
1972	13,209	165,548	1,595	13,913	1,187	21,336	19,360	16,325	150,790	331,440
1973	13,660	163,396	920	7,308	1,842	15,594	21,245	24,767	151,468	324,013
1974	12,517	176,410	3,546	32,828	2,763	23,430	19,034	21,846	139,163	351,164
1975	10,994	198,605	3,300	38,882	4,427	18,216	18,443	39,965	170,105	412,020
1976	12,080	253,756	2,948	43,989	8,714	22,387	45,695	58,285	227,299	533,757
1977	15,155	394,991	6,152	113,875	15,405	26,640	43,533	29,497	226,433	750,706
1978	12,685	378,760	4,681	98,949	21,496	34,611	18,166	46,109	234,046	733,251
1979	11,148	349,145	3,507	74,864	30,512	43,997	33,250	56,349	339,272	793,794
1980	11,648	380,933	4,156	93,236	33,317	51,514	49,865	33,232	301,934	809,421
1981	10,120	375,465	4,531	107,977	37,477	37,010	75,000	29,650	308,813	829,730
1982	9,440	398,495	5,255	164,979	51,937	52,647	131,507	39,936	495,550	1,110,962
1983	9,070	372,469	4,020	143,401	47,351	45,235	152,105	37,674	464,288	1,027,509
1984	10,340	407,438	2,124	75,872	41,033	18,966	74,985	45,070	351,050	875,393
1985	14,000	583,915	3,735	115,278	51,912	27,917	55,579	30,714	357,471	1,108,576
1986	12,620	615,729	4,217	158,146	60,491	91,497	149,896	65,274	630,765	1,465,130
1987	12,330	651,480	3,619	144,273	70,442	38,962	155,784	99,225	794,983	1,661,179

(a) From 1981 figures are not strictly comparable with those for earlier periods. For details see Chapter 18. (b) Prior to 1970-71 figures include alterations and additions to dwellings. Data for 1970-71 and later years relate to new dwellings only. (c) From July 1973 changes in the classification of residential buildings mean that figures for earlier years are not comparable. (d) Valued at \$10,000 and over. (e) Excludes the value of land. (f) From 1981 numbers of new houses are rounded to nearest ten units. (g) Not available separately; included with *Houses and Other residential buildings* as appropriate.

TRANSPORT; CUSTOMS AND EXCISE

Year	State Government railways (a)		Private railways	Air passenger movements (b)		Customs and excise gross revenue (c)			Shipping (b)(d)
	Route kilometres at end of year (e)	Paying goods and livestock carried (f)	Route kilometres at end of year (b) (g)	Perth Airport					Clearances to ports outside the State
				Internal (h)	Inter-national	Customs	Excise	Total	
		\$'000		'000	'000	\$'000	\$'000	\$'000	number
1870	-	-	-	..	..	81	-	81	131
1880	55	2	61	..	..	186	-	186	168
1890	303	62	620	..	..	356	-	356	267
1900	2,181	1,406	1,003	..	..	1,889	63	1,952	747
1910	3,452	2,278	1,452	..	..	1,543	213	1,756	726
1920	5,695	2,656	1,477	..	..	1,311	799	2,110	729
1930	6,616	3,587	1,363	..	..	3,882	1,527	5,409	794
1940	7,051	2,702	1,337	..	..	3,769	2,395	6,164	805
1950	6,843	2,889	1,246	..	..	10,166	10,943	21,109	1,006
1951	6,804	3,082	1,210	..	..	10,839	11,973	22,812	1,060
1952	6,619	3,112	1,210	..	..	14,045	16,312	30,357	1,045
1953	6,611	2,661	1,165	..	..	9,908	18,395	28,303	1,025
1954	6,616	3,257	1,220	..	..	12,241	19,447	31,688	1,005
1955	6,616	3,461	1,204	n.a.	..	12,196	21,812	34,008	1,136
1956	6,629	3,854	1,168	..	..	8,473	24,092	32,565	1,268
1957	6,626	4,291	1,136	..	n.a.	5,504	30,078	35,582	1,244
1958	6,626	3,647	925	..	..	5,476	32,547	38,023	1,219
1959	6,626	3,976	925	..	..	4,800	32,398	37,198	1,282
1960	6,630	4,605	832	..	..	5,614	33,634	39,248	1,403
1961	6,635	4,911	755	..	..	7,470	33,835	41,305	1,598
1962	(i)6,198	5,428	(j)898	..	..	7,156	35,705	42,861	1,687
1963	(i)6,111	4,870	888	..	..	8,996	35,944	44,940	1,528
1964	(i)5,918	5,271	665	..	..	10,369	37,839	48,208	1,580
1965	6,008	5,133	(k)34	..	..	10,692	43,349	54,041	1,560
1966	6,030	6,486	(l)460	270	26	15,251	53,536	68,787	1,711
1967	6,140	7,999	455	294	36	13,569	58,176	71,745	1,690
1968	6,140	9,053	455	340	49	19,468	62,903	82,371	1,770
1969	6,157	9,078	(m)882	382	54	21,202	69,289	90,490	1,848
1970	6,161	10,837	884	467	69	24,649	76,637	101,286	2,165
1971	6,175	13,457	884	541	84	32,262	88,978	121,240	2,499
1972	6,116	13,867	884	524	105	30,072	101,883	131,955	2,425
1973	6,168	13,706	(n)1,220	596	117	25,714	106,054	131,768	2,481
1974	6,192	15,059	1,222	668	139	30,612	138,197	168,809	2,655
1975	6,075	16,348	(o)1,181	681	165	44,114	148,310	192,424	2,739
1976	6,163	17,812	1,179	658	197	46,767	183,838	230,605	2,613
1977	6,165	19,003	1,155	746	206	63,037	203,852	266,889	2,562
1978	5,764	18,625	1,150	815	225	68,118	216,929	285,047	2,547
1979	5,764	19,288	1,155	879	261	71,704	256,486	328,190	2,679
1980	5,773	21,388	1,159	928	325	83,620	260,299	343,919	2,122
1981	5,773	20,271	1,160	960	377	110,939	283,499	394,438	1,903
1982	5,609	19,776	1,181	1,027	434	128,866	198,397	327,263	1,798
1983	5,610	19,791	1,177	1,005	414	130,752	379,889	510,641	2,476
1984	5,623	19,870	1,177	1,075	455	133,088	492,117	625,205	1,768
1985	5,563	22,085	1,285	1,195	502	176,416	496,172	672,588	2,370
1986	5,553	20,877	1,185	1,264	569	196,027	444,311	640,338	2,297
1987	5,553	21,264	1,185	n.y.a	n.y.a	n.y.a.	n.y.a.	n.y.a.	2,273

(a) From 1900, year ended 30 June. (b) Total embarkations and disembarkations. (c) From 1915, year ended 30 June. (d) From 1967 excludes vessels of 200 net tons and under. For 1979, figures relate to movements foreign direct or via other Australian ports. From 1980, figures relate to foreign direct movements only. (e) Open for general and passenger traffic. (f) From 1942 includes operations of Railway Road Services, which began in November 1941. (g) From 1900 to 1964 includes 446 kilometres of line open for general and passenger traffic. (h) Interstate and intrastate. (i) Decrease due to proclamations of closure issued by authority of the Railways (*Cue-Big Bell and other Railways Discontinuance Act 1960*). (j) Increase due to the transfer of all government-operated timber railways to private control. (k) Decrease due to transfer of Midland Railway Company to Western Australian Government Railways and to closure of timber and mining railways. (l) Increase due to opening of Goldsworthy-Port Hedland, Tom Price-Dampier and Westmine-Tilley iron ore railways. (m) Increase due to opening of Newman-Port Hedland iron ore railway. (n) Increase due to opening of Pannawonica-Cape Lambert iron ore railway and extensions to Goldsworthy and Tom Price railways. (o) Decrease due to closure of Westmine-Tilley iron ore railway and timber railways.

MOTOR VEHICLE REGISTRATIONS; EXPORTS OF CATTLE AND SHEEP

Year	New motor vehicles registered (a)				Motor vehicles on register (b)				Exports of—	
	Utilities,				Utilities,				Cattle Value \$'000	Sheep (c) Value \$'000
	Motor cars (d)	panel vans, trucks and buses	Motor cycles (e)	Total	Motor cars (f)	panel vans, trucks and buses	Motor cycles (e)	Total		
1860									-	4
1870									-	-
1880									-	-
1890	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1	2
1900									-	2
1910									16	9
1920					3,404				73	28
1930					31,130	11,358	7,707	50,195	1	46
1940	2,871	1,517	399	4,787	38,907	25,026	6,789	70,222	-	65
1941	1,015	632	200	1,847	36,995	24,788	6,704	68,487	2	112
1942	250	353	74	677	29,022	21,625	4,057	54,704	1	97
1943	218	151	57	426	29,750	21,189	3,935	54,874	1	-
1944	19	1,102	109	1,230	30,295	22,459	4,324	57,078	27	-
1945	40	597	192	829	30,635	23,943	4,501	59,079	2	1
1946	101	456	271	828	31,408	28,904	6,799	67,111	2	91
1947	1,354	1,126	678	3,158	32,879	32,097	8,199	73,175	27	362
1948	2,963	1,975	1,059	5,997	35,596	35,285	8,877	79,758	10	347
1949	4,684	3,122	1,769	9,575	40,199	38,901	10,974	89,994	11	374
1950	8,926	4,707	2,346	15,979	48,632	43,206	12,897	104,735	5	426
1951	8,201	6,610	2,802	17,613	56,235	47,908	14,535	118,678	9	616
1952	8,836	5,750	2,740	17,326	64,277	52,627	16,047	132,951	23	631
1953	6,879	4,881	1,416	13,176	69,917	56,445	15,565	141,927	23	501
1954	9,926	5,601	1,258	16,785	78,312	60,362	15,243	153,917	29	568
1955	12,394	5,993	1,202	19,589	90,255	63,870	14,662	168,787	68	612
1956	10,100	5,203	1,089	16,392	99,206	62,809	12,959	174,974	177	625
1957	9,321	4,418	1,192	14,931	104,506	63,315	12,731	180,552	243	923
1958	10,140	5,562	1,702	17,404	111,825	63,598	12,631	188,054	308	841
1959	10,389	5,140	2,071	17,600	119,957	65,588	12,814	198,359	396	764
1960	13,492	5,695	1,949	21,136	130,476	68,702	12,876	212,054	325	845
1961	15,161	5,542	1,080	21,783	141,612	70,974	12,589	225,175	318	881
1962	17,082	5,833	902	23,817	155,447	74,224	12,390	242,061	55	1,254
1963	23,175	6,367	754	30,296	169,800	75,500	11,500	256,800	160	1,495
1964	24,958	7,013	628	32,599	186,200	77,700	10,200	274,100	331	1,433
1965	23,304	6,897	553	30,754	197,800	78,500	8,900	285,200	427	1,376
1966	23,418	9,170	706	33,294	212,600	83,300	8,400	304,300	283	1,633
1967	27,922	9,404	1,158	38,484	231,200	86,300	8,400	325,900	381	1,771
1968	33,368	10,448	1,525	45,341	252,300	90,800	8,900	352,000	1,229	2,191
1969	35,379	11,018	1,539	47,936	275,300	94,500	9,600	379,400	972	2,943
1970	37,764	11,138	1,945	50,847	301,000	99,900	10,800	411,700	760	2,876
1971	37,769	10,872	2,718	51,359	328,500	104,900	12,200	445,600	1,159	2,710
1972	37,274	9,819	3,985	51,078	346,300	104,600	14,200	465,100	1,865	3,871
1973	36,904	11,425	4,914	53,243	364,400	107,400	16,800	488,600	1,661	7,959
1974	40,302	12,241	7,062	59,605	389,300	112,700	21,000	523,000	2,111	12,539
1975	41,474	13,693	6,613	61,780	414,800	125,000	24,600	564,400	1,498	12,862
1976	40,338	15,863	5,731	61,932	437,200	140,000	27,600	604,800	1,464	14,436
1977	44,363	17,362	3,887	65,612	473,731	153,174	28,022	654,927	2,533	(g)34,905
1978	40,990	16,538	3,339	60,867	500,365	167,107	28,051	695,523	3,071	35,985
1979	40,882	14,025	2,713	57,620	518,705	174,064	26,916	719,685	3,182	45,915
1980	40,232	13,716	4,600	58,548	535,613	179,844	29,531	744,988	1,748	91,763
1981	41,660	15,223	6,088	62,971	552,552	187,599	33,009	773,160	2,899	100,340
1982	42,329	16,079	5,835	64,243	573,400	197,344	35,213	805,957	3,039	94,825
1983	38,812	15,043	5,147	59,002	576,893	196,539	35,852	809,284	5,476	94,630
1984	39,737	15,199	3,969	58,905	592,495	201,754	35,770	830,019	5,824	92,700
1985	46,070	17,956	4,310	68,336	615,442	214,649	36,229	866,320	3,432	82,430
1986	42,645	13,676	3,350	59,671	632,182	218,851	36,324	887,357	5,339	84,317
1987	33,642	10,198	2,305	46,145	647,734	223,030	35,287	906,051	4,969	105,015

(a) Year ended 30 June. (b) From 1929, at 30 June; for earlier years, at various dates. For years before 1946, excludes Commonwealth Government-owned vehicles; from 1946, includes Commonwealth Government-owned vehicles other than those of defence services. From 1956 to 1976, series based on the results of the periodic census of motor vehicles. Improvements in the methodology used to produce statistics of motor vehicles on register have resulted in a break in the continuity of the series from 30 June 1983. (c) Includes sheep for breeding purposes. (d) From 1959, includes station wagons previously included with commercial vehicles. (e) Including motor scooters. (f) From June 1956, includes station wagons previously included with commercial vehicles. (g) Excludes interstate exports. Details are not available for publication.

EXPORTS OF CERTAIN COMMODITIES (a)

Year (b)	<i>Meats—Fresh, chilled or frozen</i>						<i>Rock lobsters (c)</i>		<i>Wheat exports (d)</i>	
	<i>Beef and veal</i>		<i>Mutton and lamb</i>		<i>Pigmeat</i>		Quantity	Value	Quantity	Value
	Quantity	Value	Quantity	Value	Quantity	Value				
	tonnes	\$'000	tonnes	\$'000	tonnes	\$'000	tonnes	\$'000	tonnes	\$'000
1840	-	-	-	-	-	-	-	-	-	-
1850	-	-	-	-	-	-	-	-	1	-
1860	-	-	-	-	-	-	-	-	-	-
1870	-	-	-	-	-	-	-	-	408	8
1880	-	-	-	-	-	-	-	-	-	-
1890	-	-	-	-	-	-	-	-	27	-
1900	(e)	(e)	(e)	(e)	(e)	(e)	-	-	54,839	813
1910	-	-	-	-	-	-	-	-	249,049	5,083
1920	300	33	-	-	-	-	-	-	679,109	12,258
1930	5,162	272	-	-	-	-	-	-	-	-
1940	4,826	329	4,665	533	2,263	324	-	-	417,214	4,669
1941	5,583	407	4,396	496	6,015	851	-	-	404,314	5,858
1942	3,576	327	3,684	435	4,670	682	-	-	266,005	4,021
1943	-	-	3,985	458	1,053	155	-	-	139,833	2,111
1944	1,445	190	6,664	763	1,568	238	-	-	328,138	5,813
1945	1,202	168	4,002	410	1,697	254	-	-	642,015	14,955
1946	4,317	558	2,269	275	3,401	545	-	-	367,682	11,696
1947	6,358	691	4,081	409	1,306	248	-	-	185,102	8,964
1948	6,353	604	5,079	584	303	53	-	-	525,857	33,809
1949	8,056	840	4,607	608	624	179	n.a.	(f)500	500,793	28,100
1950	8,625	1,183	2,392	485	163	59	518	463	585,406	33,384
1951	7,699	1,221	939	217	279	113	1,436	1,517	830,346	51,688
1952	6,028	1,135	1,044	301	424	232	1,311	1,861	730,002	45,728
1953	5,016	1,437	6,589	1,463	463	303	1,329	2,085	634,639	40,347
1954	6,148	1,748	3,309	875	215	152	1,461	2,342	185,066	11,272
1955	6,776	2,038	3,225	1,328	1,049	532	1,532	2,490	526,212	27,478
1956	7,601	2,343	6,602	2,156	743	482	1,601	3,022	619,779	28,860
1957	4,127	1,221	5,788	1,741	733	588	1,618	3,514	1,273,578	61,291
1958	11,025	3,302	5,083	1,900	2,324	1,462	2,136	3,965	725,131	40,861
1959	10,535	4,342	9,944	3,177	1,983	1,178	2,715	5,281	639,647	33,113
1960	13,597	6,742	8,735	2,378	1,188	953	2,996	6,499	999,164	49,442
1961	12,413	6,141	11,367	3,901	1,894	1,501	2,316	5,881	1,428,272	71,280
1962	12,544	6,299	8,468	2,436	3,151	2,025	3,607	9,778	2,010,766	104,356
1963	17,268	9,382	7,428	2,401	2,061	1,404	3,490	8,910	1,380,372	72,197
1964	20,528	11,497	5,385	1,895	871	718	3,416	9,211	1,497,453	77,881
1965	19,360	11,730	5,040	1,981	571	516	2,672	10,592	1,102,420	56,955
1966	18,115	12,108	10,319	4,357	420	376	3,193	13,821	1,887,996	96,515
1967	16,912	11,987	9,652	3,723	565	470	3,643	13,873	2,312,777	126,918
1968	16,821	12,995	13,153	4,745	547	474	3,919	17,989	2,373,195	121,764
1969	20,210	16,939	21,523	7,218	642	564	3,038	17,133	1,521,376	77,987
1970	23,645	21,508	29,661	11,271	1,437	1,175	2,976	15,695	1,814,787	86,593
1971	20,257	17,626	24,244	9,396	1,126	895	3,155	19,413	2,670,890	130,564
1972	24,435	22,528	42,994	17,645	2,503	1,995	3,425	24,626	2,587,504	128,132
1973	33,325	36,614	39,853	26,103	7,630	6,382	3,171	20,919	2,249,934	111,744
1974	34,778	43,039	27,189	23,682	5,939	5,772	2,656	18,511	2,139,973	211,333
1975	31,083	25,993	33,240	22,107	2,283	3,037	3,328	25,258	3,241,895	409,758
1976	35,732	32,693	52,120	34,009	2,451	3,696	3,128	27,777	3,215,792	375,897
1977	53,051	53,291	60,373	48,913	1,292	1,968	4,071	47,061	3,009,101	316,258
1978	57,827	64,896	42,532	40,885	620	984	3,902	48,043	3,795,969	351,190
1979	51,932	90,216	26,250	31,059	382	693	4,170	51,064	2,208,985	257,414
1980	41,372	93,547	44,699	51,230	204	460	3,626	50,448	4,205,774	615,944
1981	40,672	87,669	44,142	57,515	144	334	2,858	42,480	2,634,951	422,433
1982	38,399	73,673	25,367	37,057	225	446	4,491	74,532	3,826,760	594,992
1983	41,659	88,972	29,073	43,133	99	344	4,908	82,652	5,031,977	845,855
1984	32,492	80,442	26,000	39,114	282	829	5,625	101,706	3,637,624	632,247
1985	30,327	77,403	21,329	33,808	150	567	4,003	113,415	4,543,782	850,090
1986	28,012	76,709	27,055	41,766	122	373	3,600	100,280	5,342,611	989,144
1987	28,937	88,348	29,568	50,305	462	1,542	3,861	116,802	4,815,542	697,557

(a) From 1980 figures relate to foreign exports only. (b) From 1920, year ended 30 June. (c) For years 1950 to 1952, foreign exports only. Figures relate to rock lobster tails only until 1982. From 1982 figures include whole rock lobsters and tails. (d) From 1920, year ended 30 June; from 1978, excludes interstate exports. (e) Separate details not available. Total exports of fresh meats were 84 tonnes valued at \$9,164. (f) Estimated.

EXPORTS OF CERTAIN COMMODITIES (a)

Year (b)	Flour (c)		Potatoes		Fresh fruit (d)	Hides and skins	Timber (e)		Wool (f)	
	Quantity	Value	Quantity	Value	Value	Value	Quantity	Value	Quantity	Value
	tonnes	\$'000	tonnes	\$'000	\$'000	\$'000	'000 cu m	\$'000	tonnes	\$'000
1860	11	-	71	1	-	1	-	2	141	31
1870	-	-	26	-	-	-	2	10	298	99
1880	n.a.	2	-	-	-	-	6	35	811	179
1890	-	-	-	-	-	8	19	133	1,970	543
1900	47	1	113	1	1	49	33	164	3,161	523
1910	2,559	49	18	-	11	150	162	916	4,125	541
1920	117,254	5,045	1,637	54	300	482	342	1,945	11,883	1,934
1930	62,659	1,540	5,037	151	312	1,246	143	931	27,034	7,875
1940	83,159	1,301	11,953	214	740	745	143	1,251	28,487	5,558
1941	107,588	2,185	18,501	373	282	580	172	1,546	10,334	3,119
1942	77,087	1,681	10,452	213	114	772	148	1,369	36,590	10,866
1943	70,412	1,581	6,410	139	139	348	100	1,189	14,173	4,757
1944	96,941	2,344	772	22	96	680	103	1,216	33,240	11,759
1945	92,438	2,505	17,939	581	132	537	81	1,131	25,829	9,107
1946	106,088	4,667	13,219	446	488	1,274	96	1,429	54,398	19,914
1947	117,661	7,628	12,939	484	1,445	2,131	98	1,719	42,022	20,521
1948	127,002	11,326	18,623	681	1,688	2,048	102	2,230	43,671	33,244
1949	119,025	10,516	13,723	431	1,452	2,134	91	1,986	45,135	43,069
1950	105,065	8,335	10,090	384	1,780	2,329	81	1,949	45,766	50,923
1951	144,914	11,774	11,181	506	2,295	5,294	66	1,783	41,633	112,559
1952	146,584	13,669	13,514	733	2,853	3,194	68	2,075	46,633	67,680
1953	159,883	15,090	12,860	750	4,556	3,942	112	4,147	51,489	79,122
1954	134,126	11,704	16,026	1,300	3,300	3,295	109	4,480	51,083	82,260
1955	109,172	7,219	9,020	512	3,845	2,921	99	3,847	49,811	70,563
1956	117,409	7,766	2,275	171	3,393	3,274	129	5,598	58,982	70,313
1957	115,658	7,474	7,728	736	4,598	4,650	132	6,215	57,755	87,510
1958	101,448	6,907	13,998	832	3,725	3,898	158	7,496	52,167	72,686
1959	94,854	6,337	8,577	368	3,609	3,489	183	8,415	60,280	58,537
1960	79,697	5,100	9,612	436	2,437	4,767	174	7,760	62,838	77,957
1961	122,839	7,840	7,821	437	4,636	3,828	157	7,175	71,681	74,842
1962	88,889	5,891	10,328	632	2,818	4,580	161	7,528	73,584	83,865
1963	67,652	4,645	18,032	810	4,982	4,339	155	7,241	71,058	82,107
1964	62,677	4,396	9,925	353	4,016	4,966	149	6,813	82,628	114,239
1965	83,826	5,926	12,935	841	5,165	4,177	133	6,279	79,106	98,294
1966	49,130	3,378	21,362	1,393	4,838	5,447	69	3,687	97,698	115,128
1967	34,804	2,507	17,478	692	5,704	5,377	139	7,475	106,886	126,995
1968	41,918	2,944	13,142	622	4,068	4,699	85	4,947	124,708	126,417
1969	35,100	2,433	21,944	1,149	6,552	6,013	88	5,068	144,388	157,950
1970	31,173	2,257	19,888	831	6,054	7,968	96	5,666	132,778	134,796
1971	26,670	1,958	9,390	510	7,208	5,395	79	4,808	128,388	98,289
1972	18,882	1,345	8,600	371	5,245	5,356	101	6,440	159,284	120,460
1973	9,798	859	(g)4,911	(g)334	6,135	13,945	113	7,087	146,456	220,719
1974	11,232	1,380	(g)9,576	(g)1,113	5,835	13,536	100	7,407	121,113	263,330
1975	19,281	3,439	8,527	1,217	7,547	11,195	109	9,252	114,069	167,631
1976	11,658	2,022	12,196	1,636	6,047	13,728	94	9,823	153,248	231,301
1977	11,355	2,051	7,190	1,127	5,285	24,708	78	10,152	169,674	331,164
1978	8,291	1,481	5,853	390	5,976	21,147	59	8,885	123,071	251,321
1979	7,872	1,660	2,735	373	8,703	29,280	66	10,508	150,185	326,466
1980	(h)4,342	(h)1,055	(h)5,292	(h)616	(h)10,314	(h)34,716	72	12,226	141,262	378,557
1981	4,952	1,279	3,824	585	9,506	17,467	32	7,050	135,529	398,051
1982	1,578	594	5,466	947	10,783	16,736	25	5,830	127,308	394,367
1983	1,086	343	7,274	1,278	12,655	18,783	18	4,813	123,953	392,144
1984	3,127	833	2,806	756	10,013	23,998	20	5,251	121,511	406,207
1985	3,140	876	5,084	946	10,220	27,629	22	7,173	140,675	523,304
1986	1,750	550	2,338	511	12,573	13,979	22	7,330	153,987	614,202
1987	1,493	465	2,295	570	13,879	40,292	10	4,199	158,693	731,352

(a) From 1981 figures relate to foreign exports only. (b) From 1920, year ended 30 June. (c) From 1973, figures include meal and flour of wheat or maslin; from 1978, figures include meal and flour of all cereal grains. (d) Includes tomatoes for 1933 and earlier years. (e) Excludes plywood and veneers and small quantities of timber for which details are not recorded. (f) Includes greasy and degreased wool. (g) Some interstate details for 1973 included in 1974. (h) Figures represent foreign exports only.

EXPORTS OF CERTAIN COMMODITIES (a)

Year (b)	Iron ore and concentrates		Lead and zinc ores (c) (d)	Tin ore and concentrates	Ilmenite concentrate (including leucoxene) (e)		Iron and steel (f)	Gold mint bullion (g)	
	Quantity	Value	Value	Value	Quantity	Value	Value	Quantity	Value (h)
	'000 tonnes	\$'000	\$'000	\$'000	'000 tonnes	\$'000	\$'000	kg	\$'000
1850	-	-	-	-	-	-	-	-	-
1860	-	-	2	-	-	-	-	-	-
1870	-	-	29	-	-	-	-	-	-
1880	-	-	31	-	-	-	-	-	-
1890	-	-	4	11	-	-	-	715	173
1900	-	-	-	76	-	-	7	31,103	7,589
1910	-	-	4	93	-	-	5	10,389	2,835
1920	-	-	102	129	-	-	16	1,275	452
1930	-	-	19	29	-	-	3	4	1
1940	-	-	2	14	-	-	31	36,329	24,056
1941	-	-	2	12	-	-	35	37,386	25,096
1942	-	-	2	6	-	-	19	30,326	20,590
1943	-	-	1	5	-	-	5	23,514	15,744
1944	-	-	1	6	-	-	23	10,855	7,250
1945	-	-	1	5	-	-	100	-	-
1946	-	-	-	8	-	-	9	-	-
1947	-	-	5	12	-	-	99	-	-
1948	-	-	146	17	-	-	89	11,073	7,656
1949	-	-	235	31	-	-	59	-	-
1950	-	-	272	49	-	-	95	2	2
1951	-	-	263	62	-	-	83	-	-
1952	53	102	1,369	107	-	-	58	12,286	13,143
1953	553	1,079	1,681	153	-	-	357	23,608	24,798
1954	592	1,157	270	97	-	-	279	13,001	13,280
1955	589	1,149	108	146	-	-	602	19,222	19,338
1956	480	936	888	322	-	-	530	12,752	12,842
1957	334	649	960	293	-	-	1,174	23,950	24,119
1958	446	870	410	166	89	1,011	2,470	6,470	6,511
1959	598	1,169	238	304	66	648	4,218	4,106	4,118
1960	809	1,601	229	415	90	713	11,198	18,662	18,738
1961	1,035	2,101	83	325	132	1,198	12,781	78,754	79,271
1962	1,069	2,209	45	563	159	1,441	13,826	14,090	12,195
1963	1,495	2,898	33	532	183	1,717	15,107	12,970	13,048
1964	1,381	2,743	18	1,080	263	2,571	15,029	11,975	12,045
1965	1,562	3,040	662	1,229	330	3,194	17,933	15,956	16,127
1966	2,657	6,967	124	1,521	430	4,181	14,458	25,909	26,147
1967	8,530	50,890	177	2,214	443	4,440	15,658	14,930	15,107
1968	14,563	104,506	58	2,330	462	4,645	11,442	11,602	11,816
1969	19,898	151,797	161	1,843	557	5,751	27,002	11,228	12,701
1970	31,542	233,580	41	1,386	573	6,068	34,306	12,037	13,874
1971	46,273	341,702	-	1,511	563	6,631	34,571	14,665	15,760
1972	48,658	347,500	-	2,043	580	7,416	36,415	17,646	21,950
1973	66,036	420,255	6	2,277	595	7,696	36,529	16,314	30,193
1974	79,286	488,239	15	2,732	728	9,774	60,811	10,093	27,393
1975	88,070	699,843	-	3,019	672	9,893	71,493	9,263	36,666
1976	83,090	772,199	-	2,538	647	9,995	60,765	13,659	50,527
1977	84,939	900,987	-	3,939	1,184	20,155	74,508	9,980	36,863
1978	80,128	935,018	-	4,947	986	17,653	50,285	10,344	50,906
1979	84,016	978,315	-	5,074	883	17,475	72,591	n.a.	(i)99,708
1980	76,725	1,025,660	220	5,841	1,119	25,433	83,447	n.a.	(i)56,317
1981	72,756	1,069,087	-	2,469	929	23,726	42,423	1,279	22,024
1982	72,532	1,195,486	11,285	1,057	890	25,003	6,645	5,054	72,060
1983	64,551	1,405,840	14,925	1,234	780	21,986	2,959	9,536	141,340
1984	80,942	1,551,299	18,420	127	1,068	35,176	2,473	21,312	308,580
1985	87,670	1,796,578	17,407	-	1,009	36,473	741	23,036	308,424
1986	80,309	1,861,779	6,040	-	999	45,149	747	28,483	458,728
1987	71,637	1,701,851	-	-	864	55,398	929	23,247	479,790

(a) From 1980, figures relate to foreign exports only. (b) From 1970, year ended 30 June. (c) Includes silver-lead and silver-lead-zinc ores and concentrates. (d) From 1971, the value of foreign exports of lead has been nil. From 1973, figures exclude interstate exports of lead ores and concentrates, and from 1978 interstate exports of zinc ores and concentrates. (e) From 1972, figures exclude foreign exports of beneficiated ilmenite; from 1978, figures also exclude interstate exports of all ilmenite and leucoxene. (f) Principally pig-iron, cast iron and basic shapes and sections of iron and steel. (g) Gold sold abroad before consignment is not recorded as an export until actually shipped. (h) Includes additional premiums on sales of industrial gold. (i) Includes all processed gold, but excludes gold ores and concentrates.

STATISTICAL SUMMARY

EXTERNAL TRADE
(\$'000)

Year(a)	Imports (b)			Exports (b) (c)			Excess of —		Ships' stores
	Foreign	Interstate	Total	Foreign	Interstate	Total	Imports	Exports	
1850	n.a.	n.a.	125	n.a.	n.a.	44	80	..	n.a.
1860	318	20	338	160	16	175	163	..	3
1870	260	167	427	348	46	394	33	..	8
1880	349	358	707	736	252	988	..	280	11
1890	1,025	724	1,749	961	369	1,330	419	..	14
1900	6,574	5,350	11,924	11,246	2,250	13,496	..	1,572	208
1910	8,750	7,067	15,817	11,679	4,627	16,306	..	489	294
1920	9,918	14,819	24,737	28,918	2,392	31,311	..	6,574	827
1930	17,758	19,805	37,563	32,009	2,213	34,223	3,341	..	1,316
1940	12,568	27,450	40,017	19,256	28,518	47,774	..	7,756	1,380
1941	9,710	27,519	37,229	16,900	30,808	47,708	..	10,479	1,971
1942	10,391	26,110	36,501	23,157	25,241	48,398	..	11,897	2,305
1943	7,383	24,803	32,186	10,625	20,117	30,741	1,445	..	1,983
1944	7,770	26,628	34,399	22,845	13,472	36,317	..	1,919	2,747
1945	9,215	26,863	36,079	24,765	11,533	36,298	..	219	2,508
1946	11,018	32,238	43,256	38,917	11,662	50,579	..	7,322	2,511
1947	18,929	42,253	61,182	46,015	11,459	57,474	3,708	..	1,966
1948	34,311	51,329	85,640	97,389	11,599	108,989	..	23,349	2,474
1949	44,075	61,182	105,258	96,982	9,495	106,477	..	1,220	4,710
1950	68,844	70,044	138,887	106,590	12,421	119,011	19,876	..	4,720
1951	80,517	95,828	176,345	197,686	18,780	216,466	..	40,122	7,249
1952	120,474	124,209	244,683	151,562	35,404	186,966	57,717	..	8,419
1953	59,748	137,213	196,961	166,286	49,659	215,945	..	18,984	10,321
1954	85,051	165,374	250,425	136,849	39,190	176,039	74,386	..	7,266
1955	101,295	182,110	283,405	137,013	47,310	184,323	99,082	..	7,865
1956	92,963	177,952	270,915	152,286	68,466	220,752	50,164	..	10,592
1957	80,423	188,680	269,103	216,599	81,545	298,144	..	29,041	12,902
1958	91,775	195,103	286,879	179,516	79,836	259,352	27,527	..	11,602
1959	89,972	202,430	292,402	174,585	68,919	243,504	48,898	..	9,482
1960	92,363	246,696	339,059	231,766	77,278	309,043	30,016	..	8,954
1961	110,531	245,474	356,005	309,332	89,922	399,254	..	43,249	10,285
1962	100,178	245,208	345,386	287,619	84,626	372,245	..	26,859	9,379
1963	112,640	313,712	426,351	246,823	91,636	338,459	87,892	..	7,904
1964	121,677	323,176	444,854	286,132	101,811	387,943	56,911	..	9,733
1965	153,540	343,899	497,439	243,078	119,954	363,033	134,407	..	9,009
1966	175,690	403,054	578,744	314,404	119,619	434,023	144,721	..	10,058
1967	159,390	474,852	634,242	421,325	116,030	537,355	96,887	..	10,936
1968	206,980	527,052	734,031	475,260	124,505	599,765	134,266	..	14,824
1969	203,533	562,312	765,846	546,366	149,892	696,258	69,588	..	14,327
1970	242,299	640,189	882,487	675,027	149,861	824,888	57,600	..	15,092
1971	278,344	726,778	1,005,122	862,421	163,812	1,026,233	..	21,111	20,561
1972	283,263	787,788	1,071,051	946,504	156,303	1,102,807	..	31,756	22,477
1973	227,305	786,177	1,013,483	1,154,359	173,839	1,328,198	..	314,715	17,542
1974	368,910	939,361	1,308,272	1,414,968	222,208	1,637,176	..	328,904	29,224
1975	577,416	1,134,510	1,711,926	1,880,082	253,424	2,133,506	..	421,580	50,157
1976	637,439	1,418,726	2,056,165	2,117,898	290,733	2,408,631	..	352,466	46,638
1977	829,411	1,641,545	2,470,955	2,596,107	305,836	2,901,943	..	430,987	64,141
1978	937,350	1,828,510	2,765,860	2,588,954	355,151	2,944,105	..	178,245	71,009
1979	1,161,164	2,044,447	3,205,611	2,820,134	446,208	3,266,343	..	60,732	72,611
1980	1,449,694	2,337,808	3,787,502	3,854,047	635,388	4,489,434	..	701,933	126,176
1981	1,663,378	2,841,110	4,504,488	r3,595,048	812,996	r4,408,044	r96,444	..	144,285
1982	2,535,112	3,141,096	5,676,208	r3,907,623	888,540	r4,796,163	r880,045	..	134,198
1983	2,523,046	3,160,789	5,683,835	r4,797,766	1,155,698	r5,953,464	..	r269,129	129,484
1984	1,935,552	3,638,883	5,574,436	r5,062,112	1,410,145	r6,466,257	..	r891,822	r110,706
1985	r2,155,270	4,291,229	r6,446,499	r6,028,430	1,507,370	r7,535,850	..	r1,089,351	r123,237
1986	2,201,469	4,816,921	7,018,390	6,533,438	1,623,017	8,156,455	..	1,138,065	87,674

(a) From 1920, year ended 30 June. (b) From 1976, excludes interstate value of horses. Details are not available for publication. (c) Excludes ships' stores up to and including 1982. Ships' and aircraft stores for foreign owned vessels and aircraft are included in foreign and total exports from 1983 onwards. From 1982, excludes value of re-exports.

INDUSTRIAL DISPUTES; WAGE RATES; UNEMPLOYMENT BENEFIT

Year	Industrial disputes (a)				Minimum wage rate index numbers (b)		Unemployment benefit (c)
	Number of disputes	Workers involved (e)	Working days lost (mandays)		Adult male wage earners (d)		Persons on benefit (f)
			Number	Average per worker involved	Weekly	Hourly	
		'000	'000	No.			
1920	45	12.0	166.6	13.87	n.a.	n.a.	
1930	2	0.5	27.1	57.85	n.a.	n.a.	
1940	4	3.0	7.4	2.44	36.8	33.1	
1941	3	0.3	0.8	2.79	39.0	35.4	n.a.
1942	8	1.8	8.9	4.89	41.5	37.6	
1943	10	2.5	38.4	15.11	42.8	38.8	
1944	30	11.0	90.0	8.16	42.6	38.6	
1945	16	3.8	32.5	8.55	42.6	38.7	
1946	11	6.4	69.6	10.94	43.6	39.5	422
1947	7	1.8	6.1	3.44	48.4	44.1	1,095
1948	9	2.4	7.8	3.33	53.9	53.9	409
1949	16	5.7	26.3	4.64	59.6	59.7	126
1950	15	2.0	5.7	2.93	71.0	71.7	267
1951	10	4.2	5.1	1.22	85.5	85.7	60
1952	21	19.2	127.8	6.67	97.5	97.7	57
1953	11	3.7	5.0	1.36	100.4	100.7	844
1954	15	5.5	21.7	3.94	101.7	101.9	427
1955	16	9.8	9.6	0.97	106.3	106.6	157
1956	14	11.1	31.9	2.87	110.8	111.0	473
1957	14	5.4	3.1	0.57	113.9	114.1	1,940
1958	20	11.0	3.0	0.27	114.7	114.9	2,330
1959	20	11.2	11.2	1.00	120.7	120.8	2,852
1960	43	25.7	27.3	1.06	126.8	127.1	2,512
1961	22	9.7	23.2	2.40	128.8	129.0	2,154
1962	28	8.4	6.3	0.75	129.5	129.7	2,932
1963	28	42.6	32.0	0.75	132.8	133.0	2,674
1964	26	6.2	7.1	1.16	137.5	137.6	2,677
1965	33	12.6	10.0	0.79	143.5	143.5	1,679
1966	25	2.9	6.2	2.17	153.6	153.8	785
1967	26	5.1	6.0	1.18	159.6	159.9	718
1968	70	18.7	21.8	1.16	169.0	168.7	608
1969	104	59.1	101.4	1.72	179.5	179.3	524
1970	125	46.5	141.1	3.03	198.2	198.0	474
1971	132	35.8	69.4	1.94	219.5	219.4	872
1972	105	28.3	94.6	3.34	234.2	232.5	2,808
1973	160	37.6	117.3	3.12	267.9	266.3	4,960
1974	257	188.1	256.9	1.37	357.7	356.5	2,863
1975	236	53.8	100.7	1.87	401.2	398.5	9,317
1976	250	100.7	252.1	2.50	104.8	104.8	13,598
1977	229	54.9	220.5	4.02	116.0	116.0	15,706
1978	306	76.1	197.9	2.60	125.3	125.3	20,470
1979	252	169.5	348.1	2.06	131.7	131.7	(g)29,000
1980	368	69.4	191.0	2.75	145.7	145.8	(g)29,800
1981	r364	r72.9	r244.0	r3.39	166.1	166.2	28,638
1982	436	63.6	162.4	2.55	187.6	190.3	31,636
1983	300	42.3	270.6	6.40	197.2	200.9	50,992
1984	406	r69.2	r119.2	1.72	205.9	210.7	(g)r57,514
1985	358	48.7	92.9	1.91	r218.8	223.6	(g)r54,028
1986	259	50.6	143.1	2.82	224.2	229.6	55,089

(a) Excludes disputes involving cessation of work of less than 10 man-days. Details of the number of disputes and workers involved in disputes which commenced in any year and were still in progress during the following year are included in the figures for both years. (b) End of December. Prior to 1976 - Base: weighted average wage rate for Australia, 1954 = 100. From 1976 - Base: weighted average wage rate for Australia, June 1976 = 100. (c) Payment commenced 1 July 1945. (d) Excludes workers in rural industry. (e) Includes workers indirectly involved, i.e. those thrown out of work at an establishment where a stoppage occurred but not themselves parties to the dispute. (f) Year ended 30 June; average number of persons on benefit at end of each week. (g) Estimated.

CONSUMER PRICE INDEX (a)

Year ended 30 June	Group index numbers—Perth								Weighted average of eight capital cities (b)	
	Food	Clothing	Housing	Household equipment and operation	Transportation	Tobacco and alcohol	Health and personal care	Recreation and education (c)	All groups	All groups
1949	12.1	15.9	11.4						14.1	14.0
1950	13.4	18.3	12.1						15.4	15.2
1960	26.0	28.8	24.3						27.1	27.3
1961	27.3	29.5	25.8	n.a.	n.a.	n.a.	n.a.		28.1	28.4
1962	27.2	29.7	26.6						28.2	28.5
1963	27.3	29.8	27.5						28.4	28.6
1964	27.6	30.1	28.4						28.7	28.8
1965	28.7	30.4	29.1						29.6	29.9
1966	30.0	30.8	30.1						30.7	31.0
1967	31.5	31.4	31.6	35.5	32.5	31.5			32.0	31.8
1968	32.5	32.1	33.4	36.1	33.6	32.3			32.9	32.9
1969	33.0	32.8	35.6	36.8	34.2	33.0			33.7	33.7
1970	34.1	33.9	37.9	37.4	35.9	33.3	26.7	n.a.	35.0	34.8
1971	35.5	35.3	39.7	38.9	37.3	35.7	27.1		36.5	36.5
1972	36.7	37.3	42.2	41.3	39.1	38.7	30.1		38.6	39.0
1973	39.3	39.6	44.2	43.2	40.1	41.3	31.9		40.7	41.3
1974	44.7	45.0	47.1	46.4	43.1	43.8	36.6		45.0	46.6
1975	50.8	54.7	55.0	54.9	51.4	52.8	47.2		53.1	54.5
1976	56.8	63.5	66.2	65.4	60.1	65.0	39.2		60.6	61.5
1977	64.8	73.1	77.2	70.7	67.0	71.3	77.3		70.2	70.0
1978	74.4	81.2	85.1	77.4	73.1	74.8	91.7		77.8	76.7
1979	82.1	87.0	89.2	83.0	81.1	87.3	84.5		84.0	83.0
1980	91.7	92.9	92.5	89.4	90.6	94.4	96.6		91.9	91.4
1981	100.0	100.0	100.0	100.0	100.0	100.0	100.0		100.0	(b)100.0
1982	110.2	107.2	109.0	109.5	111.9	109.1	130.9		111.2	110.4
1983	119.8	114.0	118.6	120.4	123.5	122.9	159.8	(c)105.8	122.5	123.1
1984	128.9	120.9	124.1	129.1	133.9	141.0	156.9	111.8	131.0	131.6
1985	136.2	128.8	131.6	134.7	142.8	153.2	125.7	115.1	136.1	137.2
1986	146.3	140.2	141.7	145.7	153.7	168.7	135.9	123.9	147.1	148.7
1987	157.1	154.4	154.7	159.0	172.3	188.1	156.0	135.7	161.8	162.6

(a) The base of each index is Year 1980-81 100 unless otherwise noted. (b) Prior to 1980-81, weighted average of six State capital cities. (c) Base of index is March quarter 1982 100.

STATE AND LOCAL AUTHORITIES: RECEIPTS AND OUTLAY

NOTE. This series replaces 'Public Revenue and Expenditure: Consolidated Revenue Fund' and 'Net Expenditure from Loan Funds; Public Debt' on earlier pages.

(\$ million)

Year ended 30 June	Receipts and financing transactions					Outlay				
	Taxes, fees, fines	Net operating surpluses public trading enterprises	Property and other income	Grants from the Commonwealth Government	Financing transactions available	Total funds available	Final consumption expenditure goods(a)	Capital expenditure on goods(a)	Transfer payments	Net advances paid
1975	254.0	40.8	100.0	552.9	213.6	1,161.2	558.1	406.4	172.1	24.7
1976	322.1	66.2	98.9	772.5	52.8	1,312.5	728.5	435.1	131.2	17.8
1977	371.0	36.9	119.9	844.6	155.3	1,527.6	870.7	482.6	157.1	17.2
1978	423.2	80.3	167.9	974.5	258.8	1,904.6	1,004.7	550.6	330.3	18.8
1979	466.3	90.0	172.1	1,056.2	315.3	2,100.0	1,112.7	608.5	363.4	15.5
1980	518.6	97.7	184.7	1,168.1	352.0	2,321.0	1,267.0	645.6	408.8	-0.4
1981	589.9	130.2	212.4	1,307.0	280.8	2,520.4	1,425.1	627.4	465.5	2.4
1982	690.3	154.7	249.1	1,430.3	316.2	2,840.5	1,608.9	716.7	516.2	-1.3
1983	771.7	193.5	316.2	1,618.7	855.8	3,755.9	1,863.6	1,196.3	676.3	19.6
1984	923.5	273.2	355.1	1,874.6	834.9	4,261.3	2,096.1	1,252.3	850.1	62.8
1985	1,062.0	297.8	394.3	2,067.5	590.5	4,412.1	2,315.1	1,101.0	974.1	21.9
1986	1,146.7	400.7	510.1	2,213.5	651.0	4,922.0	2,580.0	1,142.8	1,122.9	76.4

(a) Includes gross fixed capital expenditure, increase in stocks and expenditure on land and intangible assets (net).

PUBLIC REVENUE AND EXPENDITURE: CONSOLIDATED REVENUE FUND
(\$'000)

Year (a)	Revenue					Expenditure						
	Common-wealth funds	Public utilities	Departmental (b)	Taxation	Territorial (c)	Total revenue	Public utilities	Interest and sinking fund	Departmental			Total expenditure
									Education	Health	Other	
1840					5	34		n.a.	n.a.			30
1850					4	38		n.a.	n.a.			33
1860					35	140		n.a.	3			123
1870	n.a.	n.a.	n.a.	n.a.	40	196	n.a.	n.a.	7	n.a.	n.a.	226
1880					72	360		40	19			409
1890					217	829		144	23			803
1900		2,612	182	244	380	5,751	1,863	880	138	198	2,049	5,231
1910	1,407	3,916	551	673	649	7,315	2,440	2,006	367	328	1,533	6,895
1920	1,197	6,364	1,188	1,688	818	11,727	5,156	4,124	829	642	1,931	13,063
1930	1,547	10,596	3,134	2,906	950	19,501	8,073	6,891	1,385	649	2,872	20,537
1931	1,547	9,228	3,279	2,269	678	17,374	6,654	7,243	1,346	486	3,950	20,215
1932	1,547	8,818	2,766	2,014	585	16,071	5,724	7,015	1,098	328	4,543	19,186
1933	1,947	8,873	2,701	2,257	558	16,664	5,682	7,009	1,108	333	3,761	18,392
1934	2,147	8,867	2,240	2,737	626	16,963	5,870	7,095	1,153	309	3,560	18,541
1935	2,413	9,837	1,562	3,804	812	18,663	6,391	7,100	1,225	326	3,342	18,997
1936	2,617	10,366	1,677	4,372	767	20,067	6,756	7,135	1,331	341	3,595	19,891
1937	2,013	10,633	1,727	4,807	773	20,371	7,247	7,237	1,432	381	4,024	21,113
1938	2,097	11,148	1,980	5,190	749	21,638	7,249	7,579	1,474	380	4,158	21,659
1939	2,087	11,159	1,786	5,728	634	21,899	7,857	7,779	1,514	401	3,992	22,340
1940	2,137	11,102	1,942	5,992	632	22,240	7,662	8,021	1,545	416	4,070	22,534
1941	2,247	11,366	1,916	6,255	638	22,864	7,534	8,114	1,568	421	4,262	22,842
1942	2,207	12,133	2,204	6,222	620	23,880	8,282	8,204	1,662	436	4,293	23,877
1943	7,852	13,518	2,497	1,330	634	26,303	9,377	8,183	1,627	458	5,564	26,254
1944	7,935	13,626	2,868	1,553	700	27,178	9,870	8,185	1,747	506	5,780	27,102
1945	8,044	13,618	3,402	1,715	697	27,908	10,064	8,251	1,778	485	6,261	27,899
1946	9,960	13,303	2,519	1,936	709	28,815	10,825	8,168	2,005	1,010	5,621	28,815
1947	11,461	11,769	3,105	2,138	1,053	29,962	10,866	8,012	2,447	1,369	5,910	30,057
1948	14,515	13,242	3,575	2,354	1,202	35,421	13,996	8,089	3,298	1,841	7,280	36,125
1949	17,136	15,032	4,564	2,683	1,106	41,121	16,720	8,215	3,519	2,613	9,942	42,756
1950	22,975	17,792	5,733	3,240	1,225	51,622	20,237	8,508	4,160	3,633	13,096	51,574
1951	25,343	19,085	5,911	3,912	1,230	56,312	21,974	8,994	5,269	4,465	13,180	55,994
1952	29,923	24,335	6,863	4,633	1,300	67,910	27,490	9,741	7,262	6,269	15,696	69,094
1953	39,056	22,385	8,557	5,247	1,513	77,768	32,044	10,611	8,686	6,926	17,639	78,784
1954	38,342	29,860	8,378	6,468	1,929	86,292	35,234	12,147	9,503	7,675	18,797	86,497
1955	38,759	32,645	9,433	7,258	2,014	91,440	36,089	13,857	11,217	8,026	19,838	92,408
1956	43,373	33,969	9,779	8,036	2,498	99,225	39,184	15,451	12,482	9,344	21,501	102,886
1957	46,759	37,133	12,548	9,027	2,433	108,662	42,022	17,043	13,636	10,067	33,645	112,487
1958	51,808	34,525	13,640	10,729	2,516	114,108	40,103	19,303	15,172	11,026	25,572	116,355
1959	55,496	36,080	14,522	10,368	2,783	120,136	40,317	20,844	15,819	11,967	29,244	123,506
1960	58,871	38,575	15,696	11,834	2,878	128,776	42,418	23,053	17,282	13,565	29,861	131,587
1961	65,519	40,830	16,372	12,079	2,797	138,665	41,072	24,628	19,541	15,018	35,160	141,075
1962	73,430	42,456	16,549	12,926	3,283	149,852	42,097	27,250	21,417	14,935	40,131	151,780
1963	75,847	43,559	18,134	14,762	3,501	157,182	42,267	29,980	22,850	16,073	41,254	158,687
1964	78,988	45,376	20,948	17,604	3,751	167,888	44,247	31,771	25,880	18,705	43,430	170,681
1965	88,565	39,778	26,712	19,512	4,107	180,143	43,360	34,669	29,133	21,160	49,401	184,840
1966	103,459	45,683	28,753	22,574	4,598	206,655	47,106	37,926	34,016	23,086	56,869	206,665
1967	106,748	52,787	31,461	27,536	7,655	228,146	53,182	41,662	36,746	26,429	61,512	228,174
1968	112,617	56,226	33,135	34,916	11,845	250,738	60,728	43,864	41,224	29,294	65,362	249,909
1969	126,621	54,407	33,035	41,602	17,301	275,081	64,016	47,083	46,441	33,613	74,822	276,135
1970	141,326	62,921	36,905	50,865	23,633	318,189	71,166	51,427	55,839	41,343	87,660	318,901
1971	170,396	68,350	45,583	48,434	32,187	367,252	79,717	54,178	66,341	52,575	107,129	371,620
1972	180,132	73,446	54,131	78,490	34,992	423,999	82,410	62,029	82,472	59,862	125,260	424,890
1973	200,633	69,158	66,711	97,141	37,162	473,840	88,372	65,280	94,547	71,866	144,005	477,330
1974	232,111	85,291	76,306	126,929	43,346	567,683	104,178	69,200	115,982	100,841	168,122	573,414
1975	313,846	108,921	96,930	160,307	49,010	734,240	121,494	75,300	165,705	148,161	213,042	743,373

(a) From 1900, year ended 30 June. (b) Reimbursements, fees, etc. (c) Revenue from sales, leases, licences and royalties relating to land, mining and timber.

NOTE. This table has been replaced by a new series 'State and Local Authorities: Receipts and Outlays' on previous page.

NET EXPENDITURE FROM LOAN FUNDS; PUBLIC DEBT
(£'000)

Year (a)	Net expenditure from loan funds on public works and services (b)							Public debt (at end of year)	
	Railways, tramways and buses	Electricity supply	Harbours, rivers, light- houses, etc.	Water supplies sewerage, drainage and irrigation	Public buildings	Other	Total	Gross amount out- standing	Sinking fund
1860	-	-	-	-	-	-	-	4	-
1870	-	-	-	-	-	-	-	-	-
1880	(c)549	-	(d)38	-	-	n.a.	(d)802	722	n.a.
1890	3	-	6	2	(e)76	n.a.	32	2,735	170
1900	302	-	395	949	-	110	1,757	23,349	754
1910	908	-	174	199	152	626	2,058	46,575	5,139
1920	242	-	204	94	21	4,765	5,327	93,644	13,656
1930	1,819	-	529	610	108	4,226	7,291	142,389	2,081
1931	878	-	257	420	-	1,457	3,012	153,130	2,621
1932	263	-	155	1,152	-	1,055	2,624	159,416	2,618
1933	374	-	485	1,355	69	1,838	4,121	167,029	2,693
1934	659	-	492	1,606	196	2,344	5,297	171,696	743
1935	997	-	610	2,155	213	1,103	5,076	177,180	1,048
1936	946	-	602	2,487	169	700	4,903	180,688	1,138
1937	491	-	352	2,303	178	741	4,064	184,666	1,292
1938	950	-	201	1,843	183	1,144	4,321	187,424	614
1939	441	-	184	1,777	230	640	3,272	190,945	719
1940	200	-	104	1,615	732	974	3,624	192,461	608
1941	214	18	152	1,649	306	480	2,819	195,583	1,147
1942	110	25	111	605	70	437	1,359	194,718	535
1943	157	92	133	100	55	217	754	193,976	347
1944	49	31	Cr. 143	75	166	34	212	192,957	140
1945	140	11	61	150	241	492	1,094	191,790	254
1946	142	208	75	473	451	276	1,625	193,852	1,008
1947	535	332	173	1,453	772	821	4,087	198,005	1,091
1948	676	1,471	316	1,388	1,097	125	5,074	200,549	309
1949	913	2,131	449	1,626	1,099	942	7,161	207,377	126
1950	4,496	4,691	804	2,002	1,357	2,859	16,209	219,100	142
1951	3,723	6,591	1,164	4,091	2,003	3,081	20,653	246,374	17
1952	15,198	6,684	2,694	4,803	2,729	3,409	35,517	276,577	647
1953	13,533	179	2,422	4,858	5,432	8,787	35,213	306,144	1,861
1954	11,295	1,406	2,328	3,939	3,144	6,276	28,388	331,565	822
1955	9,752	1,410	1,920	5,661	3,993	6,726	29,462	355,763	442
1956	6,139	2,049	1,638	5,516	4,187	7,098	26,629	377,465	245
1957	5,519	4,200	950	7,119	5,599	9,169	32,556	410,290	112
1958	4,209	2,480	1,398	7,694	5,891	6,599	28,272	436,857	147
1959	5,711	2,200	1,428	8,395	7,410	7,199	32,342	464,237	173
1960	4,953	1,553	1,373	9,547	8,723	6,355	32,504	493,575	171
1961	4,221	400	1,966	10,314	10,479	8,037	35,418	523,070	94
1962	5,432	300	2,587	10,952	12,032	6,449	37,751	555,130	222
1963	6,204	500	2,438	10,770	13,420	5,563	38,894	587,336	485
1964	7,496	-	3,028	10,537	15,630	6,409	43,100	626,045	442
1965	6,800	794	2,822	10,957	19,948	5,457	46,779	665,620	473
1966	7,628	1,434	2,583	12,667	19,908	3,580	47,800	705,514	267
1967	9,068	2,427	1,746	13,642	18,230	5,902	51,015	748,601	216
1968	7,750	4,542	2,402	14,552	18,816	5,115	53,177	792,969	408
1969	10,547	5,679	1,190	12,560	20,116	4,765	54,859	840,343	3,015
1970	6,331	4,566	2,055	13,330	24,627	8,594	59,504	886,778	182
1971	7,194	27	2,202	15,176	25,549	13,492	63,640	924,111	582
1972	5,919	3,666	1,902	18,369	23,994	32,606	86,456	975,958	1,216
1973	4,179	4,104	2,371	23,598	32,872	21,882	89,006	1,030,060	265
1974	5,569	3,467	2,505	26,708	34,324	3,291	75,863	1,074,111	4,899
1975	6,185	4,069	3,728	24,487	45,262	6,140	89,871	1,120,313	1,037

(a) From 1900, year ended 30 June. Sinking fund at 31 March from 1900 to 1928. (b) From 1928 includes expenditure from Loan Suspense Account. (c) Total amount for the years 1877 to 1881. (d) Total amount for the years 1872 to 1881. (e) Includes expenditure prior to 1890.

NOTE: This table has been replaced by a new series 'State and Local Authorities: Receipts and Outlay' on an earlier page.

BANKING AND PERMANENT BUILDING SOCIETIES

Year	Trading banks			Savings banks (a)		Permanent building societies (b)			
	Depositors' balances (c)	Loans advances and bills discounted (c)	Weekly debits to customers' accounts (d)	Operative accounts at end of year	Depositors' balances at end of year	Liabilities		Assets	
						With drawable shares	Deposits	Amount owing on loans	Total
	\$'000	\$'000	\$m		\$'000	\$'000	\$'000	\$'000	\$'000
1870	n.a.	n.a.		895	27				
1880	n.a.	n.a.		1,299	45				
1890	1,904	2,809		3,014	69				
1900	8,781	5,514	n.a.	33,646	2,598				
1910	12,627	12,228		84,262	6,955				
1920	24,742	21,594		211,415	14,516				
1930	25,524	41,773		367,665	23,457				
1940	42,219	47,529		233,649	23,720				
1950	116,458	55,301	27.4	378,670	79,225				
1951	149,244	66,680	38.6	392,790	89,345				
1952	170,923	83,353	43.6	403,678	94,342				
1953	170,234	87,353	44.2	414,288	99,589				
1954	181,863	106,429	50.8	422,480	105,229				
1955	180,895	137,830	52.4	426,637	107,258				
1956	174,070	142,156	53.9	446,419	115,868				
1957	185,576	135,074	57.1	473,548	125,386				
1958	186,478	141,198	60.4	497,690	131,896				
1959	180,300	147,106	61.5	527,079	142,998				
1960	192,076	142,064	69.7	550,966	157,246	n.a.	n.a.	n.a.	n.a.
1961	190,094	146,244	75.7	577,619	161,424				
1962	209,274	139,204	80.4	625,070	181,056				
1963	219,952	153,528	88.2	683,417	208,812				
1964	242,268	164,878	96.4	736,009	239,766				
1965	272,430	186,000	106.3	786,340	261,654				
1966	310,432	195,190	122.4	848,562	292,871				
1967	355,899	212,023	138.6	905,349	330,807				
1968	398,837	252,627	169.1	970,120	373,602				
1969	462,559	280,147	209.0	1,036,180	412,984				
1970	558,017	323,824	246.4	1,096,466	431,877				
1971	544,732	351,110	295.3	1,153,420	464,611				
1972	552,546	357,410	318.4	1,205,448	511,457				
1973	693,456	443,330	355.9	1,250,576	608,133				
1974	829,002	604,460	439.4	1,327,699	684,974				
1975	906,589	673,526	515.9	1,401,485	779,427				
1976	1,092,350	791,376	680.0	1,443,883	897,693	522,517	286,320	632,929	849,182
1977	1,376,813	927,709	814.4	1,466,200	960,548	646,176	383,451	851,896	1,078,720
1978	1,448,206	1,163,207	975.9	1,511,092	1,048,510	747,307	508,710	1,046,718	1,308,935
1979	1,621,852	1,368,657	1,173.7	1,539,416	1,133,627	858,380	681,851	1,270,625	1,601,527
1980	1,742,801	1,678,121	1,463.3	1,579,722	1,216,182	966,319	812,817	1,491,983	1,849,490
1981	2,026,507	1,943,299	1,826.3	1,647,837	1,360,315	1,020,465	994,100	1,650,304	2,100,204
1982	2,521,072	2,288,020	2,283.4	1,741,114	1,514,207	1,129,730	1,030,780	1,793,793	2,261,263
1983	2,877,685	2,571,177	2,651.2	1,835,917	1,910,538	1,265,212	948,426	1,743,068	2,312,162
1984	3,004,651	2,874,000	3,043.7	1,961,811	2,214,373	1,374,872	861,647	1,664,158	2,345,479
1985	3,622,307	3,342,663	3,857.6	2,051,681	2,402,828	1,463,808	908,036	1,807,865	2,468,670
1986	4,653,781	4,032,226	4,846.9	2,153,457	2,649,943	1,534,979	1,058,426	1,977,938	2,702,788
1987	5,143,047	4,652,428	5,133.2	2,618,596	3,975,333	n.y.a.	n.y.a.	n.y.a.	n.y.a.

(a) From 1900, year ended 30 June. (b) At 30 June. (c) Excludes loans to authorised dealers in the short-term money market. (d) Average based on amounts as at close of business each week. From 1927, year ended 30 June. (d) Weekly average for year ended 30 June. Excludes debits to Commonwealth Government accounts at city branches. From 1946-47 includes The Rural and Industries Bank of Western Australia (General Banking Department).

WESTERN AUSTRALIA IN RELATION TO AUSTRALIA

Particulars	Unit	Date or period	Western Australia	Australia	Percentage
Area	sq km	..	2,525,500	7,682,300	32.9
Proportion of area having rainfall —					
Under 250 mm	per cent	..	58.0	39.0	..
250 mm and under 500 mm	per cent	..	29.2	31.8	..
500 mm and over	per cent	..	12.8	29.2	..
Population (a) (b)	number	30 June 1987	1,496,059	16,248,836	9.2
Population increase	number	1987	37,040	230,486	16.1
Rate of population increase	per cent	1987p	2.54	1.44	..
Births registered (b)	number	1987p	23,725	239,303	9.9
Deaths registered (b)	number	1987p	9,100	116,180	7.8
Marriages registered	number	1987p	10,175	110,662	9.2
Divorce - Dissolutions granted	number	1986	4,001	39,417	10.2
Employed labour force (c)	'000	Nov. 1987	675.9	7,733.2	8.7
Average weekly earnings - all male employees (d)	\$	August 1987	498.6	458.1	..
Unemployed on benefit	number	30 June 1986	55,089	569,761	9.7
Industrial disputes - Working days lost	'000	1987p	143.1	1,390.7	10.3
Employee organisations membership	'000	June 1986	252.2	3,186.2	7.9
Area under crop	'000 hectares	1985-86	5,970	20,853	28.6
Area under sown pasture	'000 hectares	1985-86	7,077	27,507	25.7
Area of —					
Wheat for grain	'000 hectares	1985-86	4,147	11,736	35.3
Oats for grain	'000 hectares	1985-86	288	1,068	27.0
Barley for grain	'000 hectares	1985-86	826	3,284	25.2
Hay	'000 hectares	1985-86	201	843	23.8
Fruit and vineyards	'000 hectares	1985-86	9	176	5.1
Livestock —					
Sheep	'000	31 Mar. 1986	33,213	155,561	21.4
Cattle	'000	31 Mar. 1986	1,690	23,436	7.2
Pigs	'000	31 Mar. 1986	278	2,553	10.9
Production —					
Wheat for grain	'000 tonnes	1985-86	4,362	16,167	27.0
Wool (e)	'000 tonnes	1986-87	188.8	886.9	21.3
Meat (f)	'000 tonnes	1986-87	227.4	2,756.3	8.2
Whole milk (g)	mil. litres	1986-87	248	6,172	4.0
Butter (g)	tonnes	1986-87	1,400	103,929	1.3
Value of agricultural commodities produced	\$m	1985-86	2,214	15,398	14.4
Mining establishments - Value added	\$m	1984-85	(h)2,184	10,610	21.0
Iron ore production	'000 tonnes	1986-87	92,467	96,770	95.6
Coal production	'000 tonnes	1985-86	(j)3,765	134,355	2.8
Crude oil production	'000 cu m	1986-87	(j)2,141	31,504	6.8
Manufacturing establishments (k) —					
Number	..	1984-85	2,451	27,611	8.9
Employment - Average over whole year	'000	1984-85	64.2	1,018.4	6.3
Wages and salaries paid	\$m	1984-85	1,137.6	18,780.3	6.0
Value added	\$m	1984-85	2,513.2	38,387.1	7.3
New dwelling units commenced (l)	number	1986-87	15,580	116,090	13.4
Value of all building commenced	\$m	1986-87	1,518.7	17,508.1	8.7
Foreign imports	\$m f.o.b.	1986-87	2,542.2	35,736.0	7.1
Foreign exports	\$m f.o.b.	1986-87	6,626.1	34,228.0	19.4
Foreign cargo loaded	{ '000 revenue tonnes	1986-87	93,430.5	234,796.3	39.8
	{ '000 gross wt tonnes	1986-87	93,307.9	233,746.8	39.9
Foreign cargo discharged	{ '000 revenue tonnes	1986-87	4,849.0	26,824.7	18.1
	{ '000 gross wt tonnes	1985-86	4,479.0	23,417.6	19.1
Motor vehicles on register	'000	30 June 1987p	906.1	9,374.3	9.7
New motor vehicles registered	'000	1986-87	46.1	492.0	9.4
Road traffic accidents —					
Persons killed	number	1986	227	2,879	7.9
Retail sales (excluding motor vehicles, etc.)	\$m	1986-87	p5,120.2	(m)56,807.8	9.0
Savings bank deposits per head	\$	30 June 1987	2,725	3,262	..
Household income per head	\$	1986-87	11,551	12,420	..
Age and invalid pensions (including wives and spouse/carers pensions)	number	30 June 1987	142,334	1,726,086	8.2
Disability and service pensions (including dependants)	number	30 June 1987	68,292	813,294	8.4
Student enrolment —					
Government schools (n)	number	1987p	208,078	2,196,742	9.5
Non-government schools (n)	number	1987p	62,662	808,141	7.8
Universities	number	30 April 1986	14,140	180,657	7.8
Colleges of Advances Education	number	30 April 1986	23,259	(o)209,077	11.1

(a) Based on Estimated Resident Population. (b) Based on State of usual residence. (c) In civilian employment. Excludes defence forces and employees in agriculture and private domestic service, and trainee teachers. (d) Not comparable with 'Average weekly earnings per employed male unit' previously published. (e) In terms of greasy wool. Comprises shorn wool, fellmongered wool and wool exported on skins. (f) Dressed carcass weight. Excludes offal. (g) Source: Australian Dairy Corporation. (h) Excludes establishments predominantly engaged in quarrying sand and gravel. (i) As reported to Department of Mines. (j) Source: Department of Resources and Energy. (k) Excludes details for single establishments employing less than four persons. Excludes electricity and gas establishments. (l) Number of new dwelling units has been rounded to nearest ten. (m) Excludes details of Northern Territory. (n) Source: National Schools Statistics Collection. (o) Relates to all students enrolled in advanced education courses.

APPENDIX

Articles Published in Previous Issues (a)

In cases where an article has been published in more than one previous issue, the reference to its last appearance only is given.

<i>Article</i>	<i>Year Book</i>
Aboriginal population, history of	1984, pp.1-8
Agriculture, Institute of, University of Western Australia	1975, pp. 217-18
Air pollution and the weather	1975, pp. 63-5
Albany, Port of	1971, pp. 449-51
ANZAAS Congress: Perth, 1973	1973, pp. 562-4
Basic wage, historical summary -	
Commonwealth	1968, pp. 396-401
State	1968, pp. 403-5
Captain Fremantle's Report of Arrival of First Settlers, text of	1976, pp. 541-2
Captain Stirling's 'Narrative of Operations', text of	1974, pp. 533-41
Census of Wholesale Establishments, 1968-69	1976, pp. 434-7
Censuses of population and housing, 1911 to 1966	1972, pp. 547-70
Centenary of the discovery of the Collie coalfields	1983, pp. 393-7
Community Welfare, Department for, history of	1981, pp. 135-9
Computer Service Centre, Perth	1969, p. 504
Conservation of the fauna	1976, pp. 93-5
Conservation of the flora	1975, pp. 78-80
Crown Law Department, history of	1983, pp. 129-31
Education Department, history of	1972, pp. 117-21
Electoral Divisions (Commonwealth)	1971, pp. 97-8
Electoral Divisions (Commonwealth), origin of name of	1970, p. 530
Electoral Provinces and Electoral Districts (State)	1976, pp. 116-17
Esperance, Port of	1973, pp. 444-6
Exploration in Western Australia	1975, pp. 9-28
Export price index	1970, p. 507
Fisheries and Wildlife, Department of, history of	1984, pp. 121-4
Flag of Western Australia, history	1984, p. 120
Flora of Western Australia -	
Acacia	1965, pp. 59-60
'Christmas tree' (<i>Nuytsia floribunda</i>)	1962, p. 51
Economic value of the flora	1968, pp.54-5
Grasses	1976, pp. 69-72
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Proteaceae family in Western Australia	1974, pp. 52-4
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Special features of the flora	1962, pp. 51-2
Forests Department, history of	1976, pp. 125-7
Fremantle, Port of	1970, pp. 441-3
Geraldton, Port of	1972, pp. 447-9
Government administration, Commonwealth	1973, p. 542
Governor Darling's letter to the Earl of Bathurst, text of	1974, pp. 541-2
Governors and Acting Governors of Western Australia	1982, pp. 121-2
Governor Stirling's Commission dated 4 March 1831, text of	1979, pp. 12-16
Historical review — chronological notes from 1829	1967, pp. 2-33
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Housing and Construction, historical review	1986, pp. 367-9
Hydrocarbon Exploration on the North-West Shelf	1976, pp. 37-9

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Industrial Development, Department of	1974, p. 403
Integrated Economic Censuses, 1968-69	1971, pp. 552-64
Kuri Bay pearls	1974, pp. 558-9
Labour Force Survey	1971, pp. 508-10
Land settlement schemes, government	1976, pp. 328-9
Land tenure system, origin and development of	1960, pp. 198-9
Lands and Surveys Department, history of	1980, pp. 128-31
Linseed, area and production	1973, pp. 349-50
Local government in Western Australia, development of	1971, pp. 565-70
McNess Housing Trust	1969, p. 205
Major Lockyer's letter to Colonial Secretary MacLeay, text of	1977, pp. 553-7
Maritime Museum, Western Australian	1986, pp. 237-8
Meteorites, Western Australian	1973, pp. 34-5
Meteorological services -	
History of	1960, pp. 34-5
Provision of	1966, pp. 46-7
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Mines, Department of, history of	1977, pp. 117-25
Overseas arrivals and departures	1971, pp. 145-6
Parliamentary procedure and administrative machinery	1970, pp. 106-9
Perth's underground water	1980, pp. 43-5
Pest control without insecticides	1973, pp. 93-5
Pesticides, effect on beneficial forms of life	1969, pp. 90-1
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Poisonous plants of Western Australia	1970, pp. 56-9
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Principal events of 1970	1971, p. 571
Public Works Department, history of	1971, pp. 116-19
Pyrites, production of	1973, pp. 393-4
Railways -	
Origin and development	1968, pp. 360-1
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Rainfall in agricultural areas, 1969	1970, p. 529
Rents (weekly) of unfurnished houses and flats	1973, p. 216
Satellites and Meteorology	1973, pp. 51-4
Settlement at King George's Sound, early history of	1977, pp. 556-9
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Third Party Claims Tribunal	1973, p. 254
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Tourism, Department of, history of	1975, pp. 132-6
Trade, constitutional provisions and legislation	1973, p. 412
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Trade, overseas, encouragement of	1973, pp. 412-13
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University — principal benefactions	1969, p. 173
Use of pesticides in Western Australia	1971, pp. 87-90
West Australian Economy, 1959 to 1973	1973, pp. 565-71
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Wheat, development of production	1968, p. 270

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Maps Published in Previous Issues (a)

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Areas of current development	1970, <i>facing</i> p. 336
Comprehensive Agricultural Areas Water Supply Scheme	1985, p. 258
Electoral Divisions (Commonwealth)	1971, <i>between</i> p. 96 and p. 97
Electoral Provinces and Electoral Districts (State)	1969, <i>between</i> p. 96 and p. 97
Electricity supplies	1967, <i>facing</i> p. 320
Epicentres of large earthquakes	1971, p. 33
General map of the State showing statistical divisions, local government areas, roads, railways, air routes and isohyets	1973, <i>inside back</i> <i>cover</i>
General map of the State showing physical features, roads, railways and airfields	1975 <i>inside back</i> <i>cover</i>
Geological sketch map	1986, p. 12
Major water supply towns	1986, p265-6
Perth Statistical Division	1978, <i>facing</i> p. 112
Port of Fremantle (Outer and Inner Harbour)	1970, <i>facing</i> p. 448
Port of Port Hedland	1974, p. 437
Production, main areas of	1975, <i>inside back</i> <i>cover</i>
Railways and road services — routes operated	1967, <i>facing</i> p. 384
Railways road services — routes operated	1964, p. 354
Rainfall	1969, <i>facing</i> p. 32
Rainfall in agricultural areas, 1969	1970, p. 529
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Sedimentary basins and Precambrian blocks	1986, p. 17
South-West Irrigation Districts	1985, p. 262
South-West of Western Australia showing median rainfall, July-September	1986, p. 47
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South-West of Western Australia showing predominant agricultural activities	1986, <i>facing</i> p.300
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Tracks of tropical cyclones (1975-1982)	1983, p. 60
Vegetation Provinces of Western Australia	1974, p. 56
Wettest six monthly period of year	1986, p. 34

(a) Commencing with the present series: No. 1—1957.

Statistical Publications

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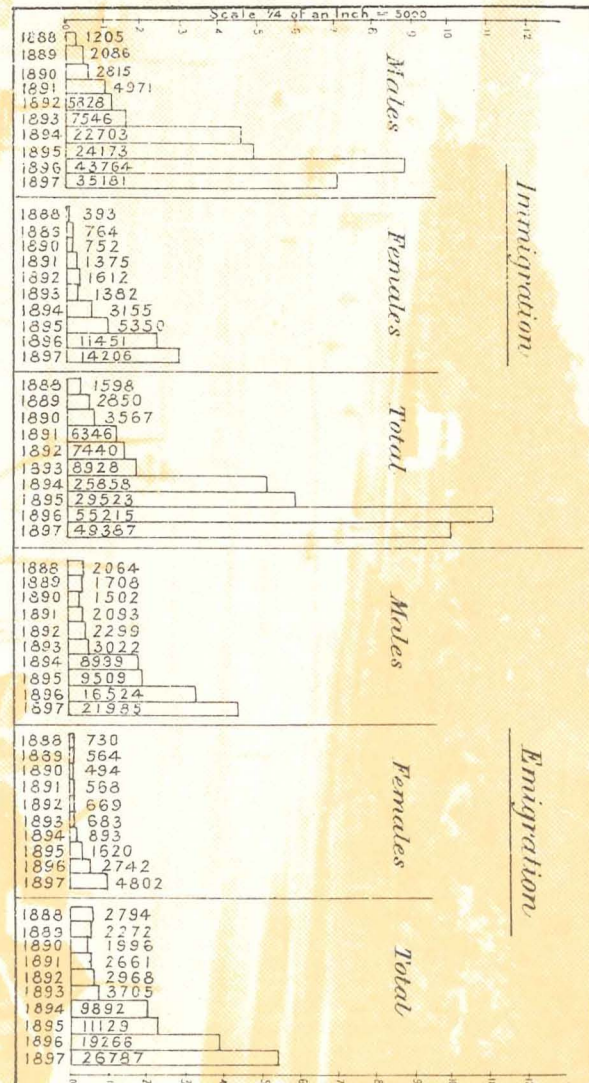
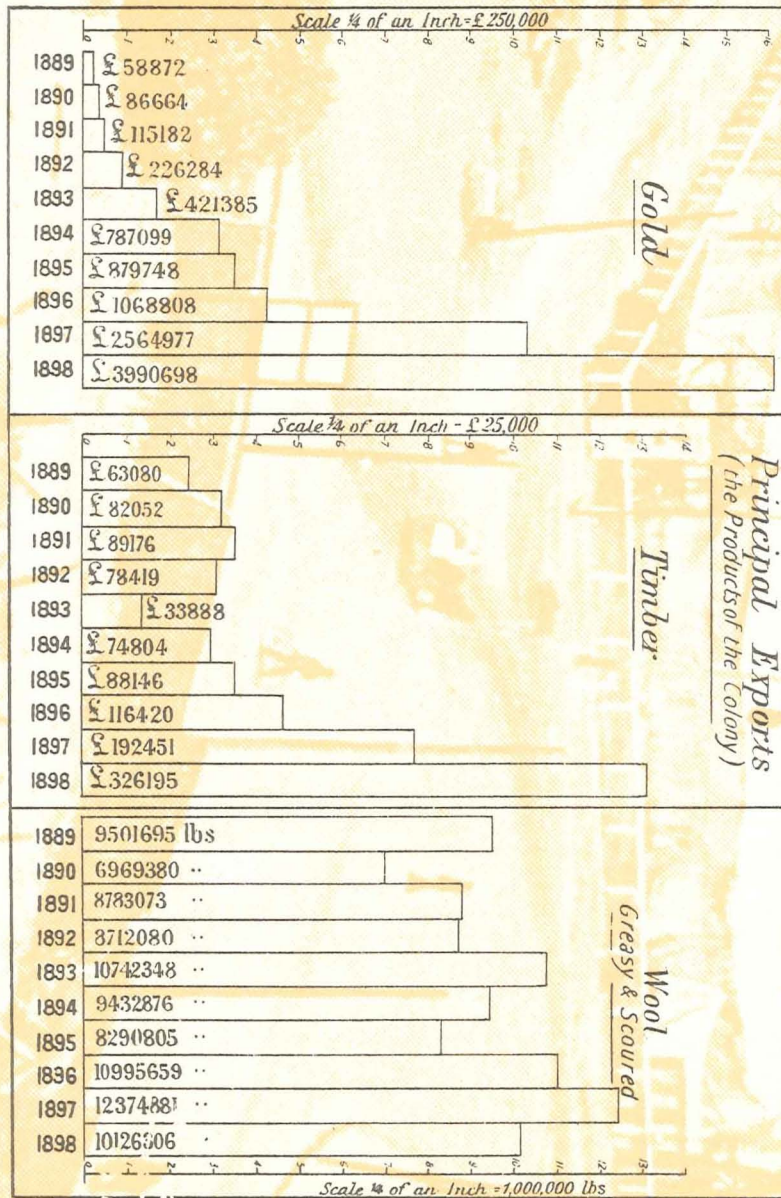
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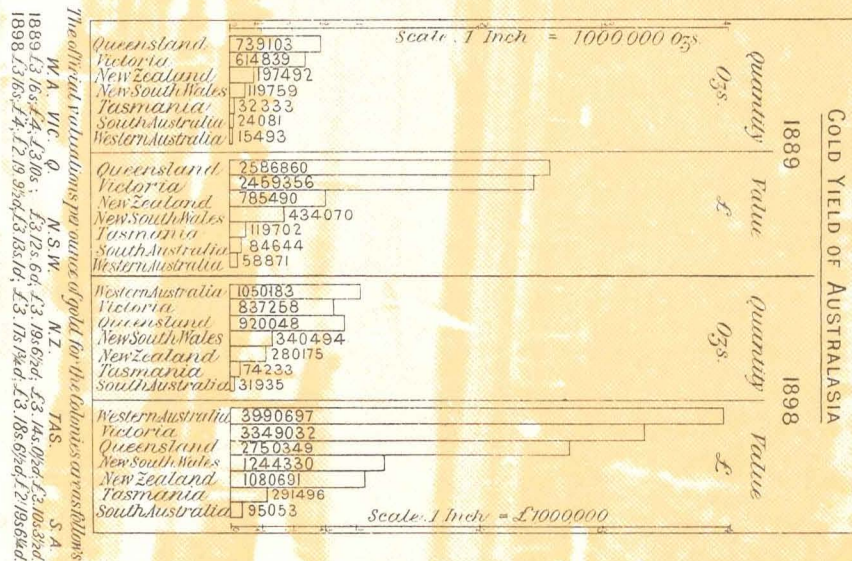
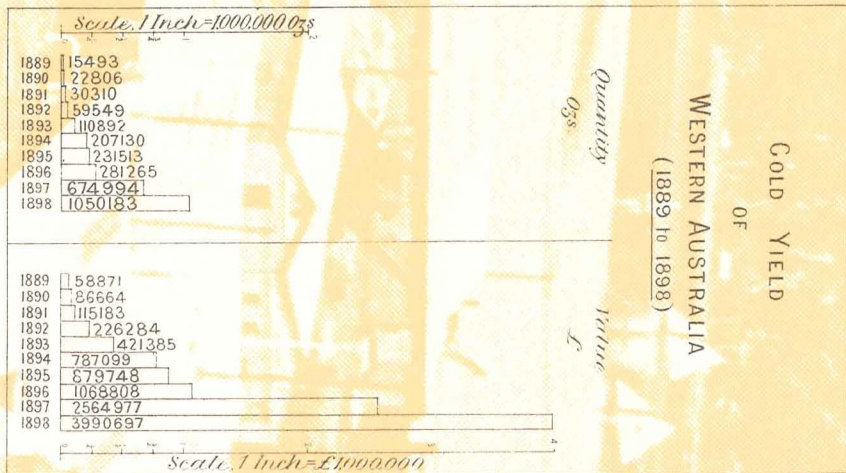
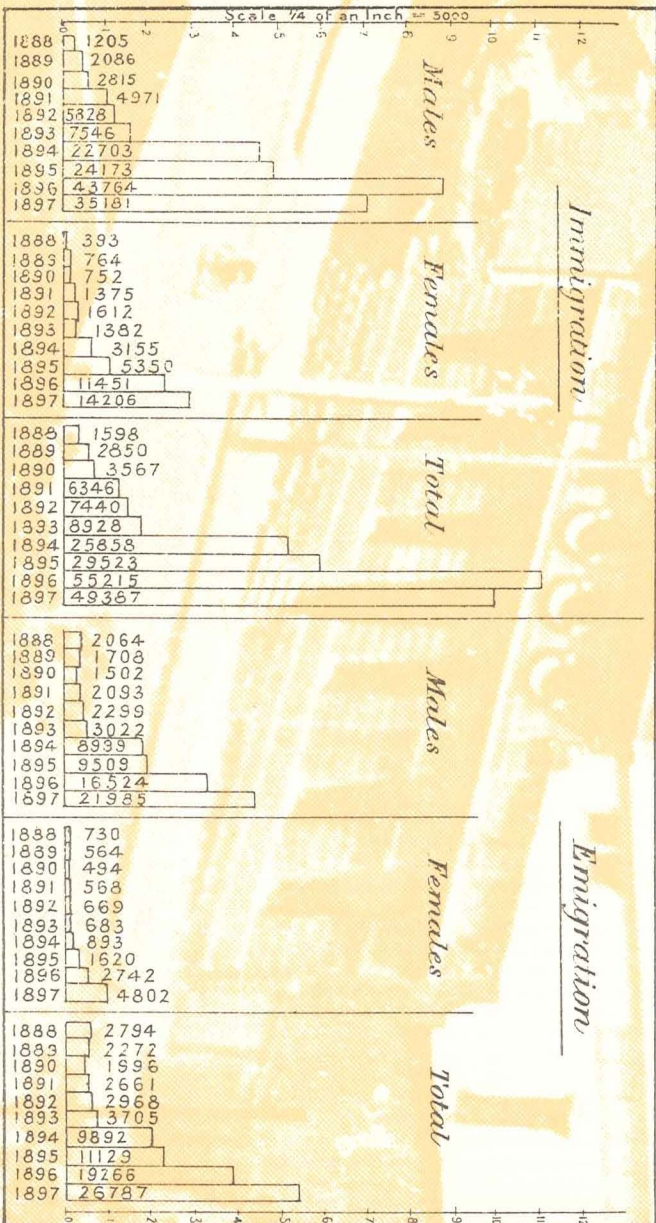
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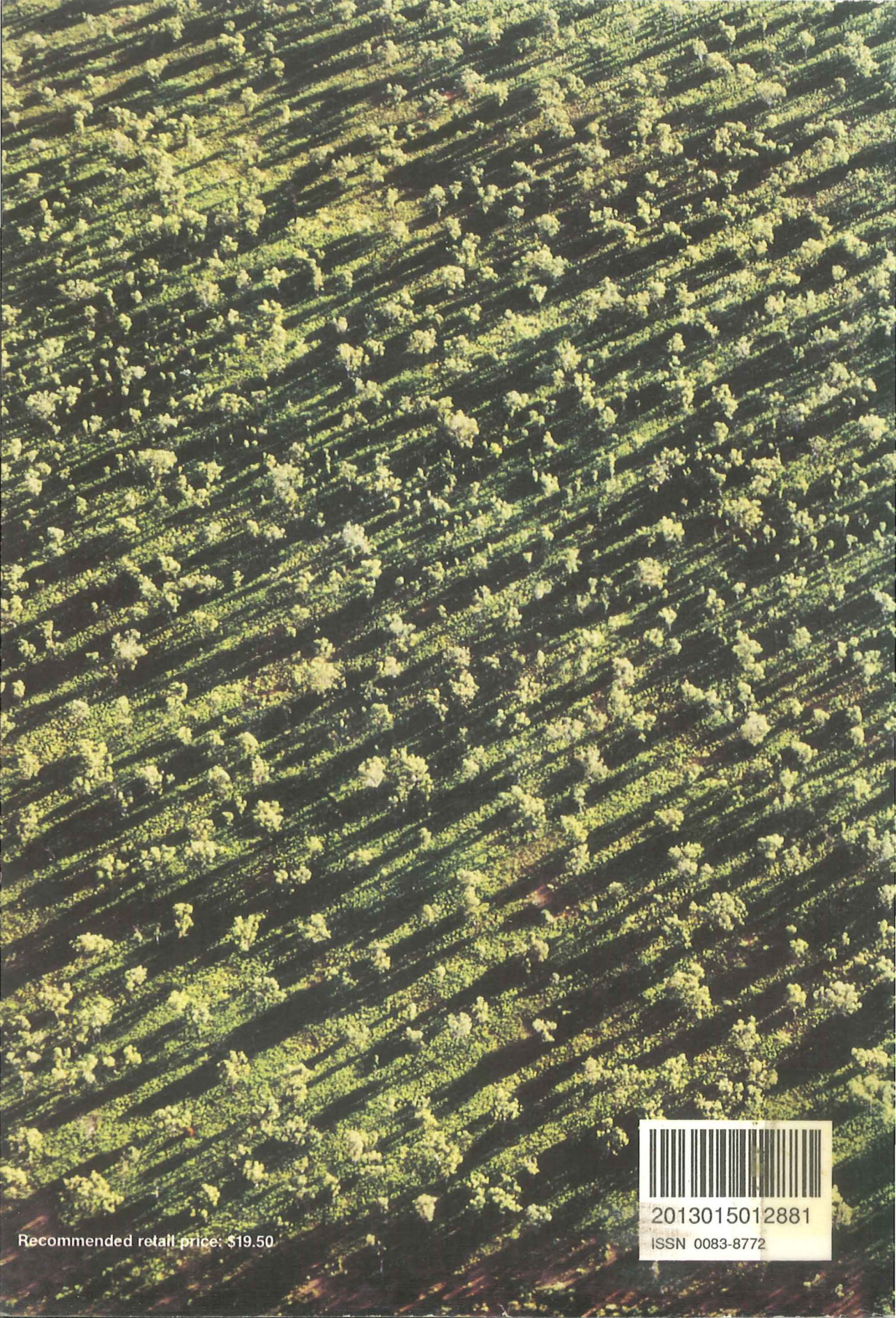


The official regulations and prices of gold for the various countries are as follows:

W.A. VIC. Q. N.S.W. N.Z. TAS. S.A.

1889, £3 16s 14d, £3 10s; £3 12s 6d, £3 19s 6d; £3 14s 6d, £3 10s 3d.

1898, £3 16s 14d, £2 19s 6d, £3 18s 1d; £3 14s 6d, £3 10s 3d, £2 19s 6d.



Recommended retail price: \$19.50



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